ELECTRICAL WEST

March 1955
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.

Cooling Water Was Problem 63

San Diego Library Goes Modern ... 76

How Subtransmission Voltage Was Chosen 66

PCEA Readies for Business 91

Mechanical Billing Saves $75,000 61

Radiators Installed Without Untanking 68

Power Equipped Line Truck 70

Lift Slab Calls for Ingenuity 79

Utilities Report on 1954 Sales 82

Optimism Is Keynote of San Francisco Market 95

Word gets around!

Shown here are the latest Edison "selling" adve
part of an effective "put yourself in this picture
the benefits of electric living upon every custo
territory.

In describing them as "selling" advertisements, we put the word in quotes for a definite reason. It is that these, like all Edison appliance advertisements, are aimed at helping to bring customers into appliance dealers' stores. The actual sales are rung up on dealer cash registers. *Edison tells them, and the dealer sells them !*

SOUTHERN CALIFORNIA EDISON COMPANY

"FOLLOW THE TREND"

approved recessed lighting

SMOOT-HOLMAN

ARCHITECTS AND BUILDERS PREFERENCE

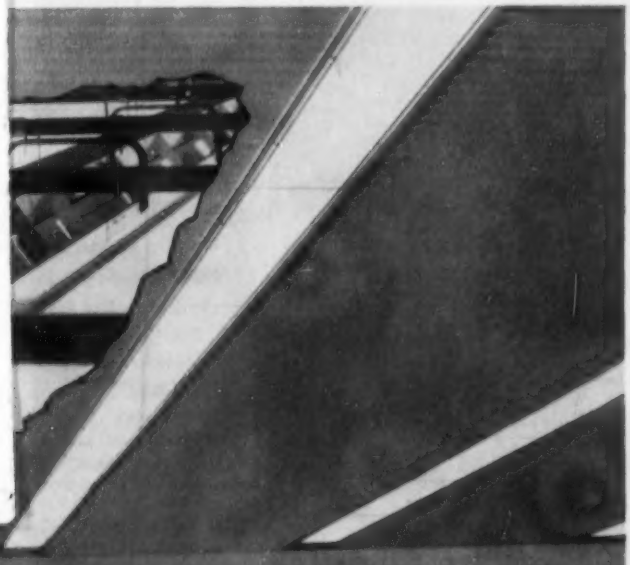
SMOOT-HOLMAN

RECESSED TROFFERS

CLEAN CEILING AND THE FINEST IN LIGHTING

OR THE LATEST IN QUALITY LIGHTING BE SURE

O CALL OR WRITE US FOR BULLETIN NO. 168



BRANCH OFFICE AND WAREHOUSE SAN FRANCISCO · SALES OFFICES IN MOST PRINCIPAL CITIES

Word gets around!

Shown here are the latest Edison "selling" advertisements for 1955. They're part of an effective "put yourself in this picture" series designed to impress the benefits of electric living upon every customer everywhere in Edison territory.

In describing them as "selling" advertisements, we put the word in quotes for a definite reason. It is that these, like all Edison appliance advertisements, are aimed at helping to bring customers into appliance dealers' stores. The actual sales are rung up on dealer cash registers. *Edison tells them, and the dealer sells them !*

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BRANCH OFFICE AND WAREHOUSE SAN FRANCISCO · SALES OFFICES IN MOST PRINCIPAL CITIES

ELECTRICAL WEST

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

THE ALL-INDUSTRY MAGAZINE OF PROGRESS, ESTABLISHED 1887,
and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-eighth year of publication.

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Peggy Beyer, Associate Editor
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Next Month

April is the industrial issue. The lead article will deal with the Alcan aluminum smelter at Kitimat, B.C., and the 300-kv transmission serving it. Two articles will feature 277/480-v commercial wiring systems. The first germanium power rectifier in this country will be described. A number of articles will deal with interesting industrial applications.

ADVERTISING REPRESENTATIVES

Chicago (11) ..... Michael I. O'Connell, 520 N. Michigan Ave.
Los Angeles (17) ..... Carl Dysinger, 1111 Wilshire Blvd., MA 7-4323
New York (36) ..... Walter Klein, 330 W. 42nd St.
San Francisco (4) ..... Tom Carmody, Dick Alcorn, 68 Post St., DO 2-4600
Offices: Atlanta, Boston, Cleveland, Dallas, Detroit, Philadelphia, Pittsburgh, St. Louis

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ELECTRICAL WEST (with which is consolidated The Journal of Electricity). MARCH 1955. Vol. 114, No. 3. Published monthly by McGraw-Hill Company of California. **Publication office, 1111 Wilshire Blvd., Los Angeles 17, Calif. Executive, Editorial and Advertising Offices: 68 Post St., San Francisco 4, Calif.** James H. McGraw (1860-1948), Founder; Donald C. McGraw, Chairman of the Board; George C. Tenney, President; John W. Otterson, Vice President; B. M. Baccoli, Secretary and Treasurer. **Subscriptions: Address correspondence to Electrical West—Subscription Service, 68 Post St., San Francisco 4, Calif. Allow 30 days for change of address. Please indicate position and company connection on all subscription orders.** Single copies 25c. Subscription rates—U. S. possessions and Latin American Republics: $2 a year; $3 for two years; $4 for three years. Canada $2.50 a year; $5 for three years. All other countries $3 a year; $5 for two years; $6 for three years. Entered as second class matter April 17, 1947, at the post office at Los Angeles, Calif., under the act of March 3, 1879. Printed in U. S. A.

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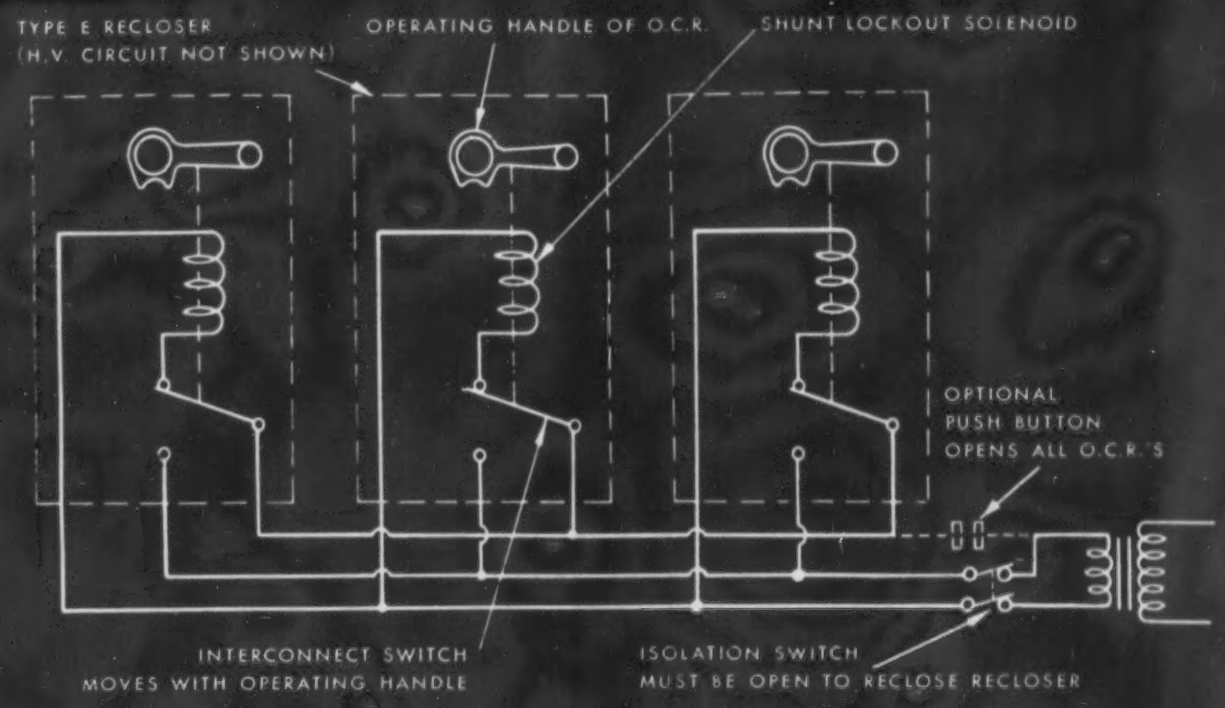


Wiring diagram shows shunt lockout solenoids as applied to three Kyle Type E 23 kv reclosers. If any one phase locks out, the solenoids automatically lock out the other two phases.

Solenoid for Kyle® Type E Recloser Prevents Prolonged Single-Phasing

New shunt lockout solenoid is now available on Kyle Type E reclosers to prevent prolonged single-phasing of three-phase feeder. The Type E recloser coils are rated from 5 to 100 amperes at 23 kv with high interrupting capacities of 2500 amperes at 14.4 kv, 1750 amperes at 23 kv.

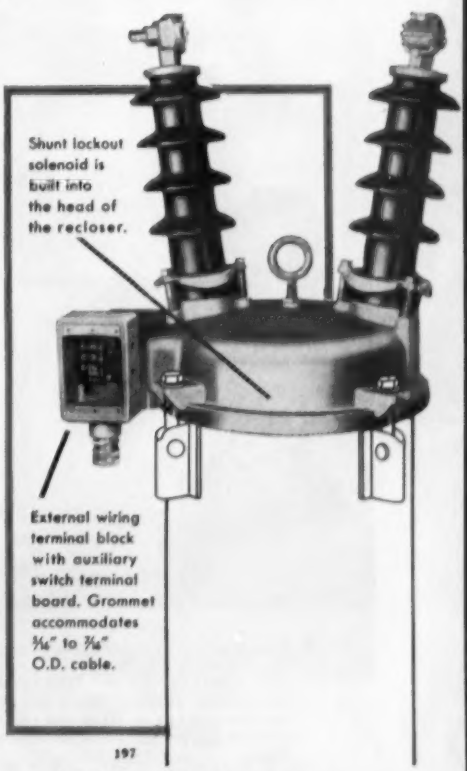
By **W. C. Wiechmann**
Application Engineer, Kyle Products Sales, Line Material Company

The shunt lockout solenoid, available on L-M's Kyle Type E recloser, is designed to trip the lockout latch and lock the recloser out. Electrical interconnection of the Type E recloser is made through the solenoid coils, thereby providing multi-phase lockout of the feeder. This multi-phase lockout will prevent a back-feed to a fault through the other phases —and eliminate prolonged single-phasing on three-phase equipment.

The shunt lockout solenoid is built into the head mechanism of the recloser. If any one phase locks out, the solenoid locks out the other two phases. The coil operates on 115 volt service and requires approximately 250 va per recloser. If an existing secondary is not available, a 1½ kva transformer is recommended. The device is an additional feature which is built in at the factory, on order.

The Kyle Type E is the only 23 kv recloser on the market. It has exceptionally strong construction and heavy insulation. The large contacts of finest arc-resisting material and the improved oil cross-blast method of arc extinction make the Type E an outstanding recloser for high-voltage application.

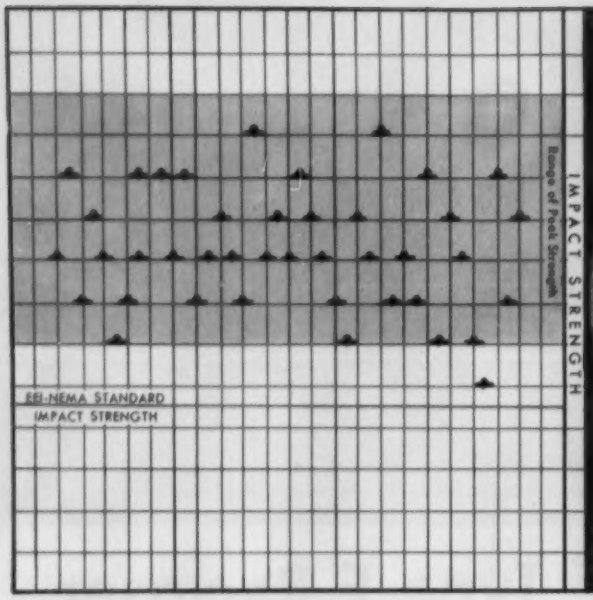
Get details on the Type E recloser and the multi-phase lockout, both of which have proved so successful in service. Ask the L-M Field Engineer for copy of bulletin on the Kyle Type E, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

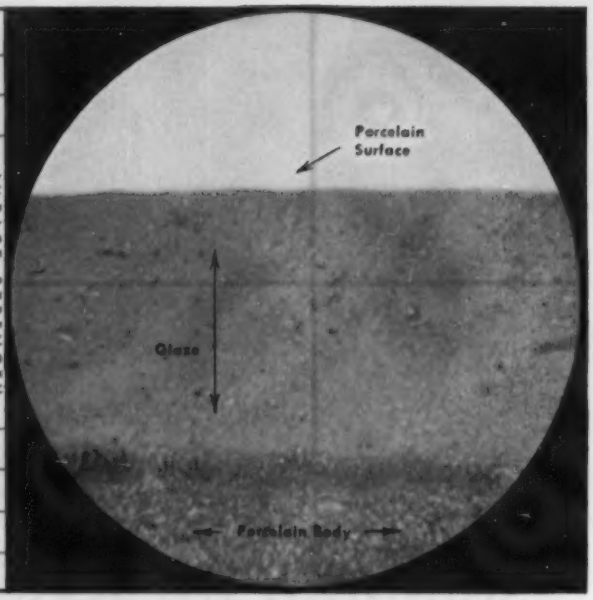

Shunt lockout solenoid is built into the head of the recloser.
External wiring terminal block with auxiliary switch terminal board. Grommet accommodates 5/16" to 7/16" O.D. cable.

197

LINE MATERIAL Kyle® Reclosers

6 Reasons Why Utilities Specify



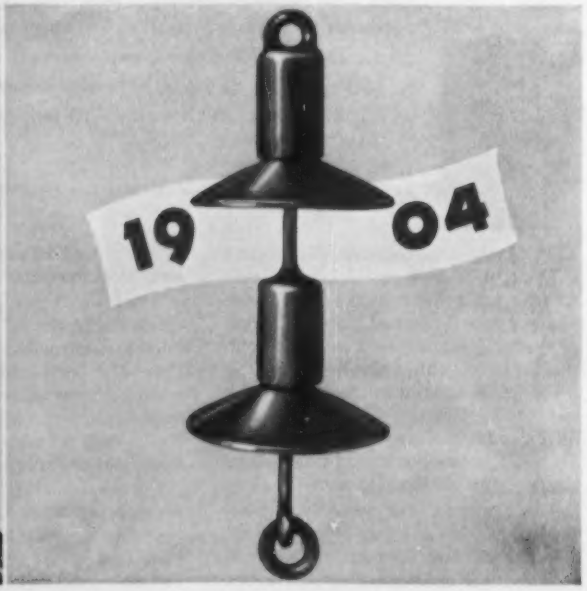


1. No Weak Sisters

AIEE standard tests show 98% of 10" MICRO-GLAZE* insulators tested fall within range of "peak impact strength." Representative industry samples tested were below this range.

2. Micro-control of Glaze Thickness

By precisely controlling glaze thickness (shown in photomicrograph of insulator surface section), Locke develops peak porcelain strength in production of suspension insulators.



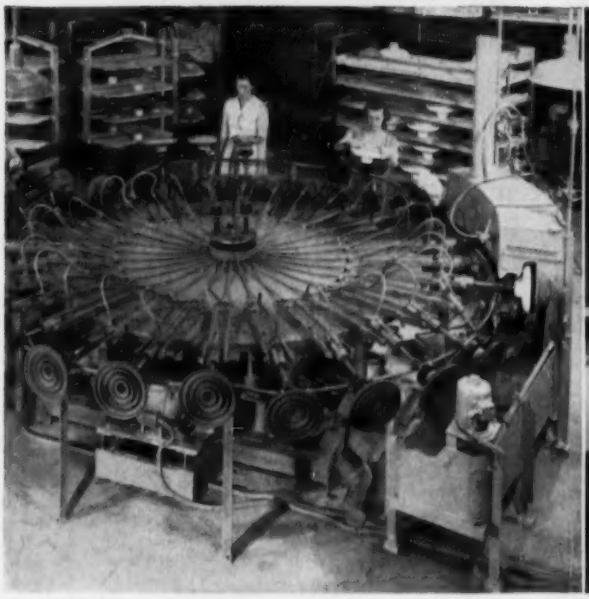
5. Less Chance of Damage

By installing Locke Microglaze* Suspension Insulators, utilities invest in extra protection against damage in transport and installation, as well as against malicious damage of transmission lines.

6. Half Century of Service

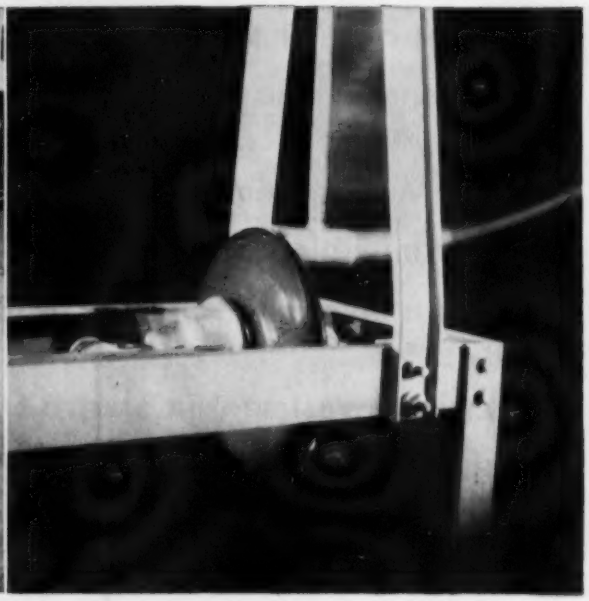
Since 1904 Locke suspension insulators have served dependably on power lines throughout the world. Half a century of outstanding product development stands behind Locke Microglaze* Suspension Insulators.

Locke MICROGLAZE Suspension Insulators



3. Precision Glazing

As insulators spin their way around this machine, they are cleaned, moistened, glazed exactly alike. With other controls, this assures uniform appearance, top strength, uniform reliability.



4. Highest Impact Resistance

Standard Impact Tests were pioneered by Locke. Hammer blows of increasing severity prove the standard impact rating is an understatement of the true strength of MICROGLAZE* suspension insulators.

Do as more utilities are doing every day--specify LOCKE Microglaze* Suspension Insulators

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

*Trademark of General Electric Company

Any electric utility company

with peak and/or seasonal demands that strain existing facilities, should consider this:

General Motors Electro-Mobile Power may be purchased for single or multiple applications—to fit the KW. needs—requiring no greater an investment than *present* power demands justify.

The capital investment in Electro-Mobile Power is far less than that of a steam installation for low load factor uses.

The fixed charges on Electro-Mobile Power units are materially less than those of any alternate power source.

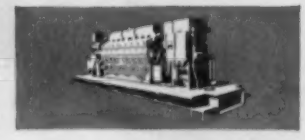
Line loss is reduced to a small fraction by placing this flexible Electro-Mobile equipment at the point of need.

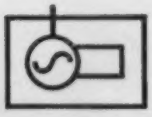
The equipment is designed to be moved from site to site with negligible cost in time or money.

Write for simple formula explaining investment advantages of Electro-Mobile Power:

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS • LA GRANGE, ILLINOIS



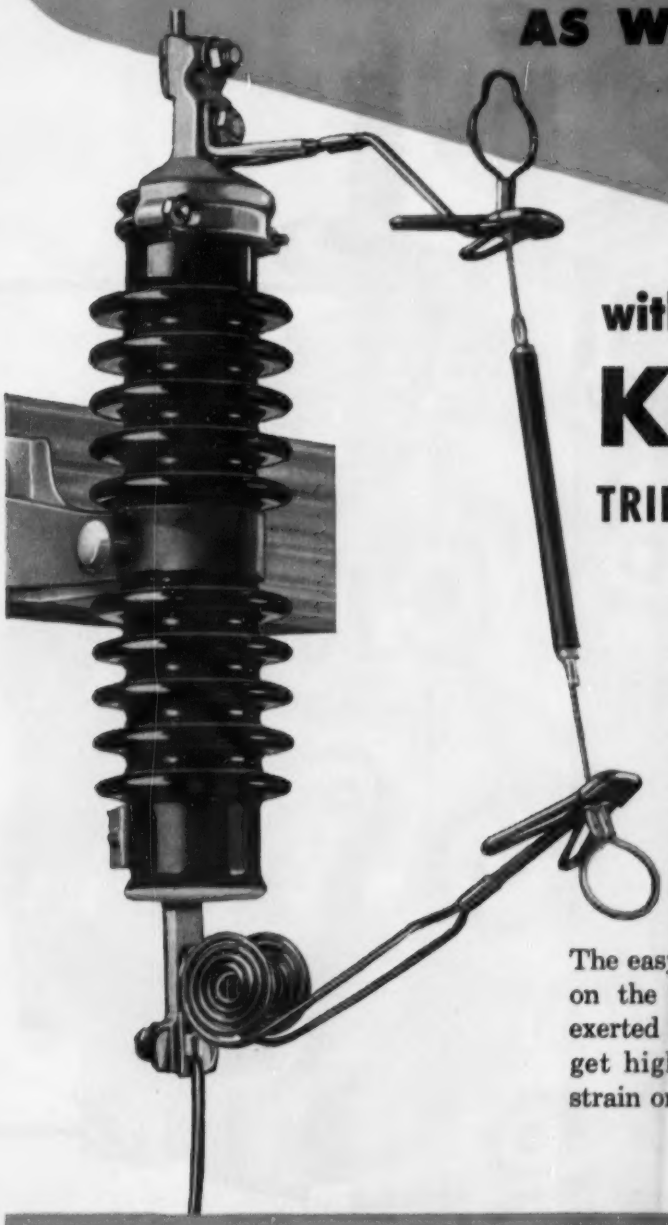


Rail car, truck trailer and portable units—350 to 1,000 KW.

Sold and serviced directly through a manufacturer's organization. Electro-Motive Division offices located in: New York City, Chicago, Jacksonville, St. Louis and San Francisco.

Protect your Customer..

AS WELL AS YOUR EQUIPMENT



with low-cost, dependable

KEARNEY

TRIP-O-LINK FUSE CUTOUTS

These simple and practical fuse cutouts are economical to install and easy to service. The Trip-O-Link fuse link combines the fuse and cartridge in a single, replaceable unit. Inside the fibrelined cartridge the arc is extinguished less than a cycle after interruption. When the fuse blows, the spring tension holding the fuse is released, speeding arc interruption.

The easy-to-catch contacts exert 30-40 lbs. grip on the fuse cable, but the vertical pressure exerted by spring tension is only 3½ lbs. You get high-pressure contacts without excessive strain on the fuse element.

JRK 281W

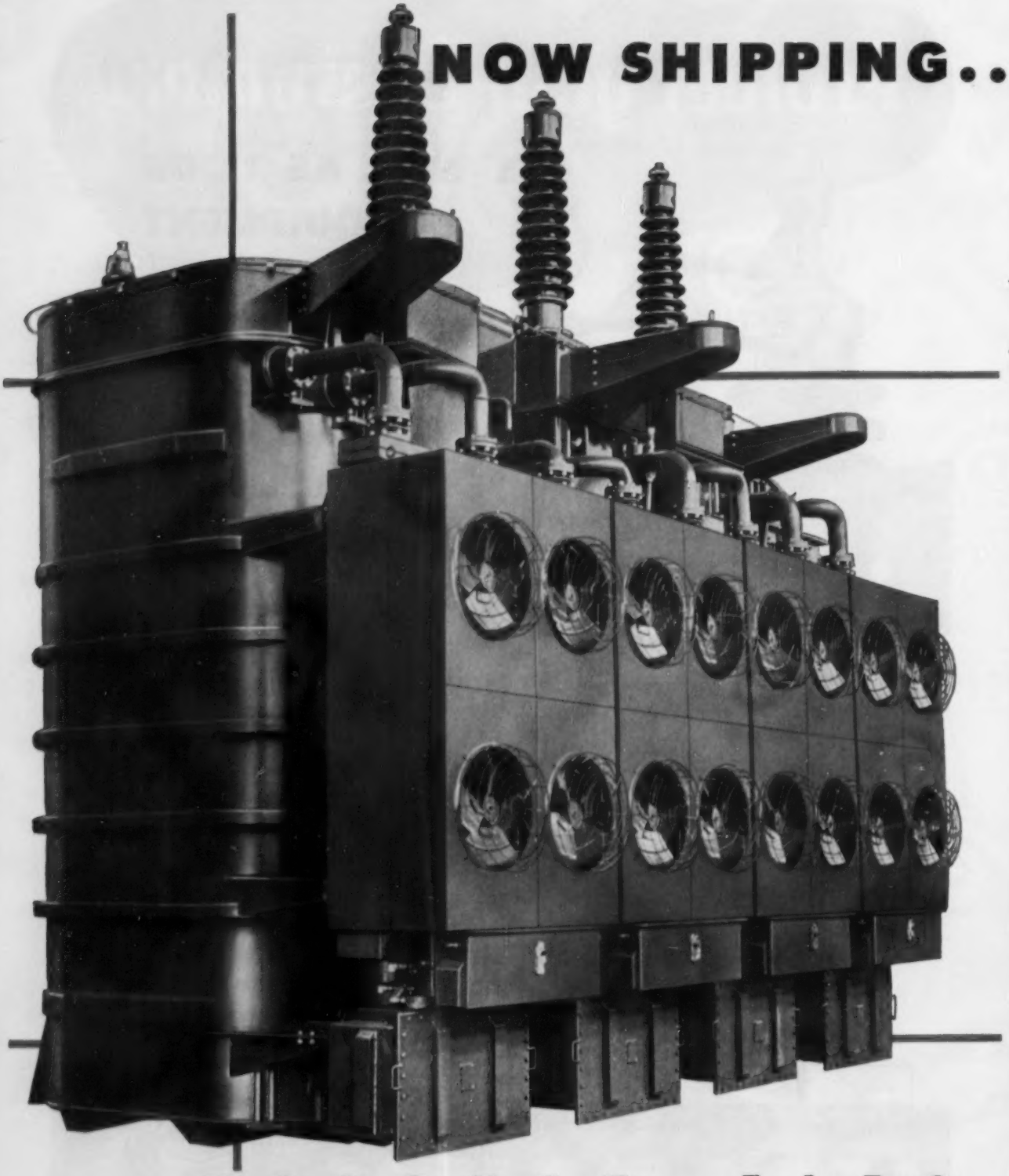
For Better Construction...Safer Maintenance

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

Specify **KEARNEY** *The Mark of Quality* **PRODUCTS**

MAYDWELL & HARTZELL, *INCORPORATED* • WEST COAST DISTRIBUTORS • Los Angeles • San Francisco • Portland • Seattle • Spokane • Phoenix

NOW SHIPPING..



M O L O N E Y E L E C

Power Transformers • Distribution Transformers • Step Voltage
Load Center Transformers • Unit Substations • Network Transformers

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES

• HIGH KVA TRANSFORMERS FROM

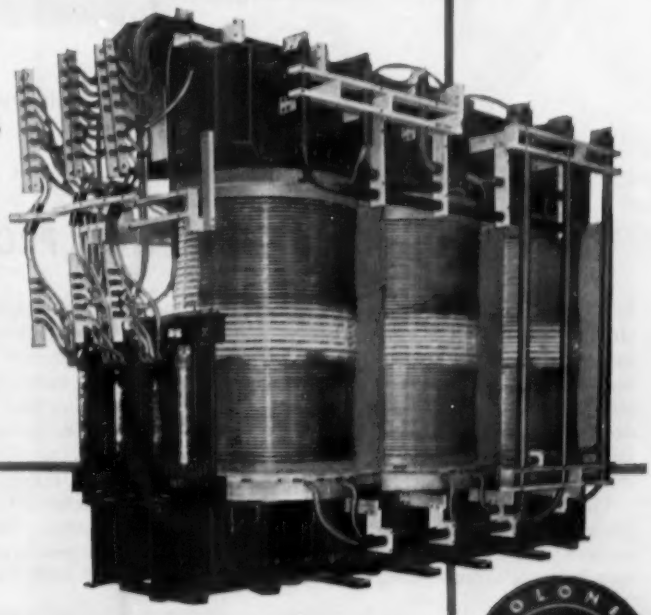
THE NEW MOLONEY ELECTRIC POWER BAY

This 125,000 Kva, three-phase, Power Transformer recently shipped to Union Electric Co. of St. Louis for installation at their Cahokia Generating Plant.

Load Tap Changing Transformer rated 125,000 Kva, three-phase, with a high voltage of 138,000 volts grounded wye and a low voltage of 13,800 volts delta with load tap changing equipment providing plus or minus 10% voltage regulation in 32 equal steps of ⅝%. Four Unit Coolers each with separate oil pumps provide ample heat transfer for this oil-immersed forced-oil cooled transformer with forced-air-coolers (Class FOA Cooling System). This unit will be installed with 115 Kv self supporting lightning arresters.

This transformer will serve as a tie between a 13.8 Kv generating bus and a 138 Kv transmission line and is equipped with two independent delta connected low voltage windings each rated 62,500 Kva and each brought out through the tank cover separately. The switching reactor is mounted on the side of the core-and-coil with the load tap changing switch mechanism leads directly above. Both the Load Transfer Switch and the Tap Selector Switch are located in oil-tight compartments, each separate from the other and both separate from the main core-and-coil.

MEDS-6



TRIC COMPANY

Regulators • Regulating Transformers • Load Tap Changing Transformers
Constant Current Transformers • Capacitors • Transformers For Electronics

AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Deep under San Francisco streets . . .

Across Santa Clara County countryside . . .

At a Los Angeles airport . . .

and on a California campus . . .

UNDERGROUND CONSTRUCTION PROBLEMS ARE QUICKLY SOLVED

In deep, narrow trenches new Soapstone OCT-O-DUCT quickly solves installation problems, because it handles so fast and easy. In long, straight runs it can be laid at phenomenal speeds—a 3-man crew has laid over 1,600 trench feet of 4-way duct in an 8-hour shift.

Flat sides make erection of complicated duct systems simple. The airport job pictured above combines nine 3-inch communication ducts and four 4-inch power ducts in a single system. Where excessive groundwater puts a premium on fast duct erection and encasement, again OCT-O-DUCT is your best answer.

With Western power and telephone utilities, industrial and governmental organizations, the trend is to new Soapstone OCT-O-DUCT. Contractors, too, like OCT-O-DUCT. Its low price and installation cost, combined with its outstanding electrical, chemical and mechanical characteristics, give you the least expensive, yet surest underground circuit protection. Try OCT-O-DUCT on **your** next underground job.

For additional information write for Specifications Bulletin 54A and for Installation Manual 54B.

SOAPSTONE DUCT COMPANY

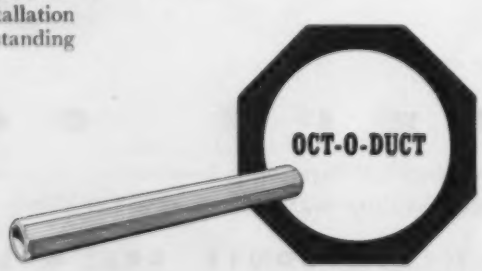
110 Linfield Drive, Menlo Park, California

Distributed in the West by

MAYDWELL AND HARTZELL, INC.

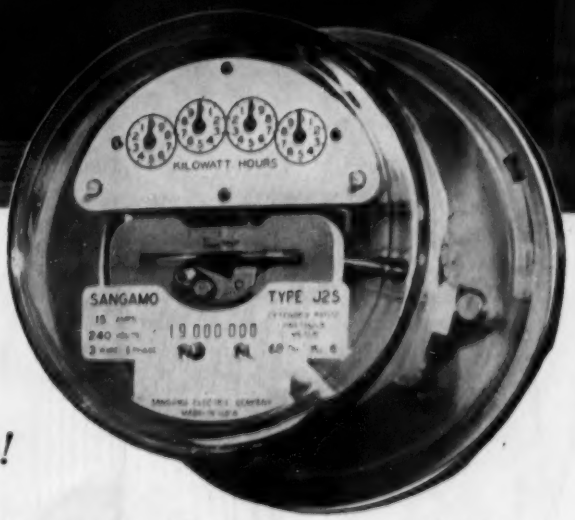
San Francisco • Los Angeles • Phoenix

Portland • Seattle



the J2 Meter is the SLOW SPEED METER

it's as simple as — 694,450 / 416,666



the J2 makes fewer revolutions *and fewer revolutions mean less wear . . . longer service life!*

The J2 Watthour Meter is the *slow speed meter*. It makes fewer revolutions than other meters—including the J2's predecessor, the Sangamo Type J—to measure the same load.

Fewer revolutions mean less wear on all moving parts . . . and *less wear means longer service life.*

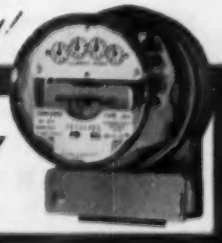
Here's what this means in terms of only one year's time. The J2 has a 6.0 constant. It makes 166⅔ revolutions to measure one kilowatthour. The J Meter had a 3.6 constant. It made 277.7 revolutions to measure one kilowatthour.

Today's average residential load is 2500 kilowatthours. If you multiply this figure by 277.7, you get 694,450—the number of revolutions a 3.6 constant meter must make in order to measure 2500 kilowatthours.

Let's multiply 2500 kilowatthours by 166⅔, the speed of the J2 Meter. Here we get 416,666 revolutions per average load per year. And the difference between 694,450 and 416,666 is 277,784. In other words, the J2 makes 277,784 *fewer* revolutions in a year to measure the *same* load.

While the total fewer revolutions the J2 makes in only a year's time is impressive, think what it would add up to by 1985! Doesn't it stand to reason that there will be less wear on the moving parts of the J2? And with less wear on moving parts, it just naturally follows that the J2 will give many more years of trouble-free service.

the FIRST watthour meter with straight line accuracy up to 100 amperes!



SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

JM55-2

MILLIONS OF FEET NOW IN SERVICE

BECAUSE OF PROVED PERFORMANCE

ROCKBESTOS
PNR SMALL DIAMETER CONTROL CABLE

There are still a few who haven't yet taken advantage of PNR . . . the lighter, smaller control cable. But it's come a long way since we first introduced its Polyethylene, Nylon, Rockhide insulation to industry just six short years ago.

Today, many utilities specify it. And there are millions of feet in service.

If you haven't tried it yet, get the complete PNR story today. Write or ask your nearest Rockbestos representative.

*Average determined by comparison with conventional control cable.

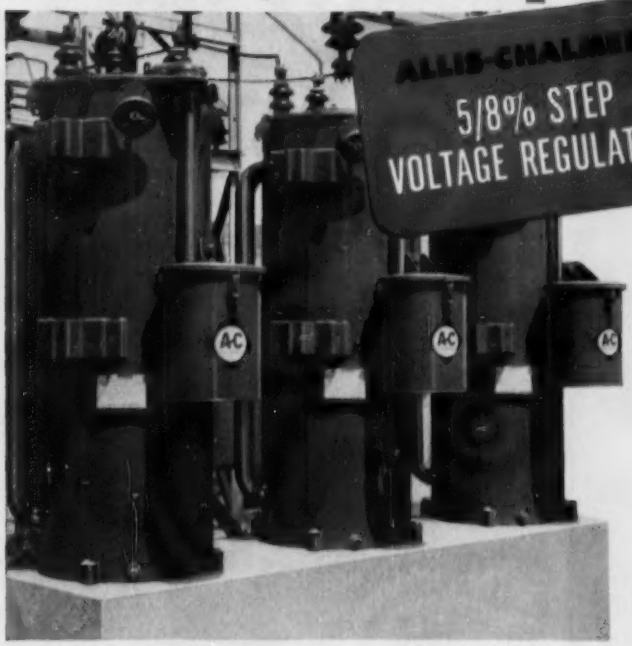
PROPERTIES OF PNR

46% smaller in area* . . . 28% smaller in diameter* than conventional control cable.
Use smaller conduit and fittings or put more conductors in existing conduit.
Lighter, easier to handle, store, ship, pull through conduit.
Dielectric breakdown . . . over 40 times operating voltage.
Rated 600 volts . . . conductor operating temperature 167°F.
Flexible from 167° to —67°F.
No cracking!

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONN.

NEW YORK • CLEVELAND • DETROIT
CHICAGO • PITTSBURGH • ST. LOUIS
LOS ANGELES • NEW ORLEANS
OAKLAND, CALIFORNIA • SEATTLE

HOW to add revenue with 5/8% Step Regulators

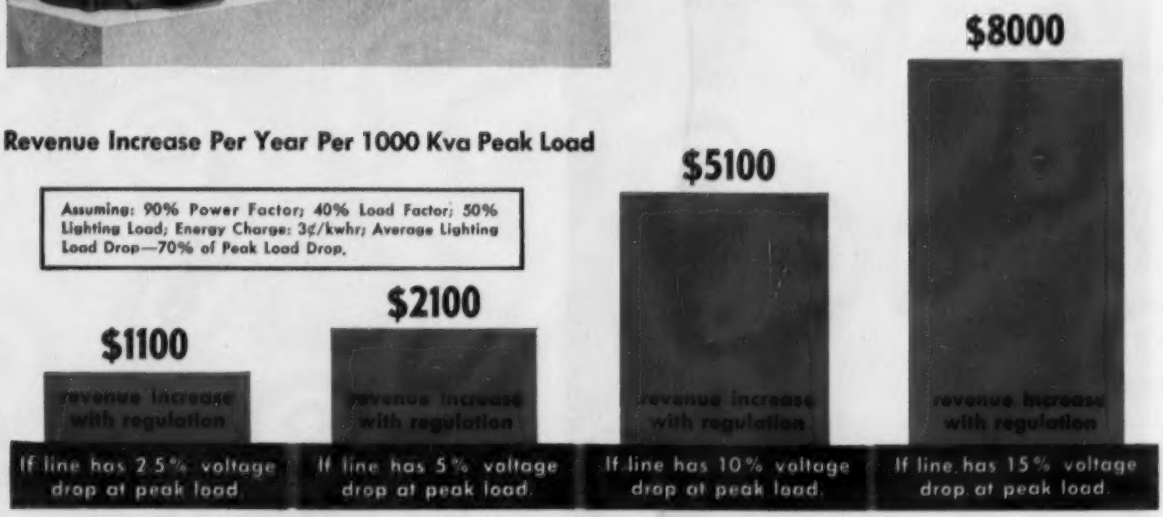


With only 5% low voltage at peak loads, you can increase revenue $2100 per regulator the first year by correcting voltage with an Allis-Chalmers distribution regulator. That increase is more than the regulator costs. Taking all factors into consideration, it's enough to pay back initial investment in less than two years, in most cases.

And you improve your maintenance picture too. With A-C regulators reducing or eliminating complaints due to low voltage, you get more from service crews and equipment. Use them where they are really needed instead of wasting manpower and money testing voltage at customers' homes.

Revenue Increase Per Year Per 1000 Kva Peak Load

Assuming: 90% Power Factor; 40% Load Factor; 50% Lighting Load; Energy Charge: 3¢/kwhr; Average Lighting Load Drop—70% of Peak Load Drop.

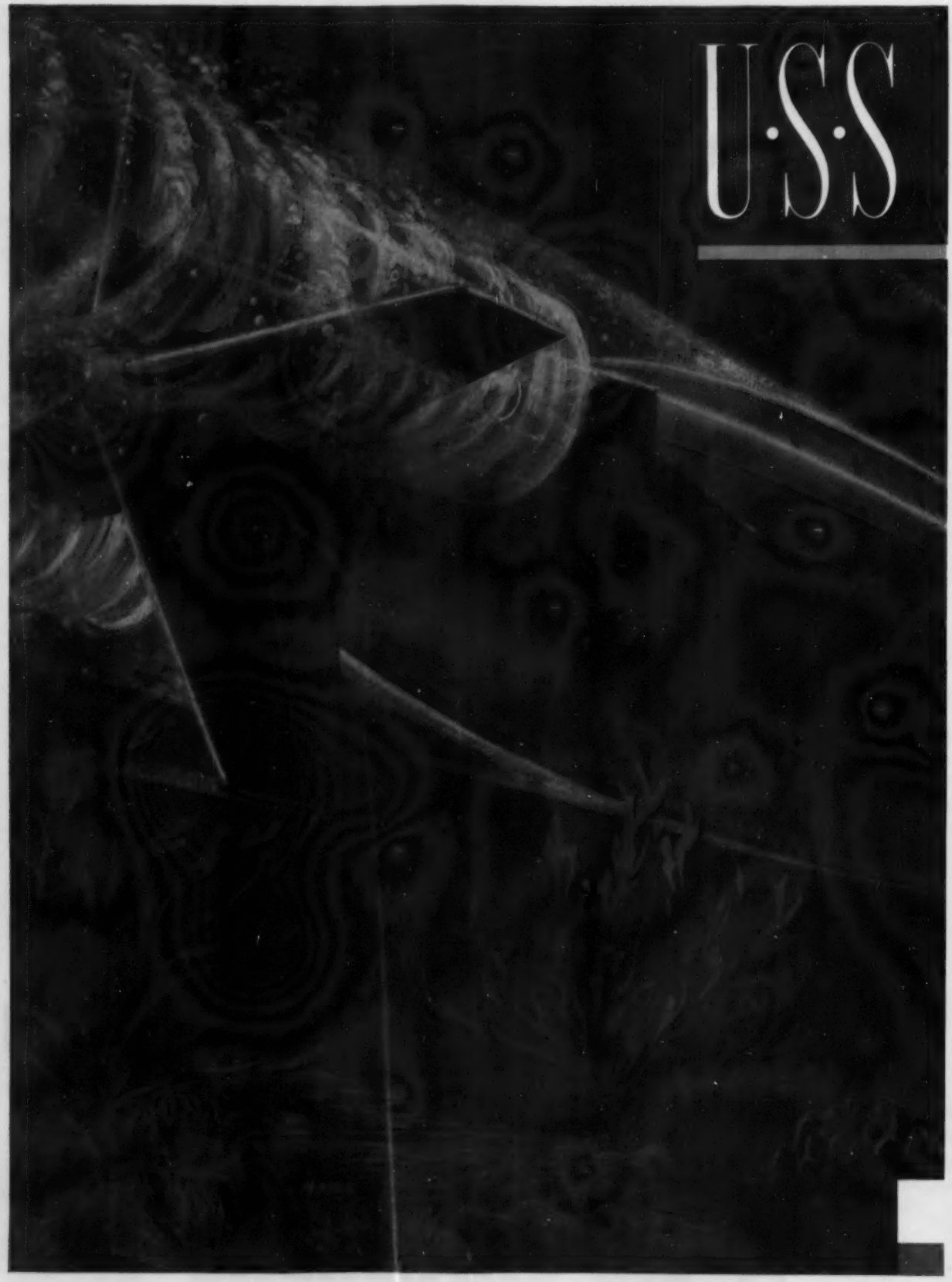

$1100
revenue increase with regulation
If line has 2.5% voltage drop at peak load.
$2100
revenue increase with regulation
If line has 5% voltage drop at peak load.
$5100
revenue increase with regulation
If line has 10% voltage drop at peak load.
$8000
revenue increase with regulation
If line has 15% voltage drop at peak load.

Low Maintenance, Long Life Proved by Experience

When you specify an Allis-Chalmers voltage regulator you know you'll get a unit with minimum maintenance, longest possible life. No other 5/8% step regulator gives you proof from years of actual field experience. Allis-Chalmers step-type regulators — all using the same basic designs — have been turning in excellent service records for over 20 years.

More facts are available. Get them from your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4565

ALLIS-CHALMERS


U·S·S

Nautilus

first
atomic submarine
uses

TIGER BRAND ELECTRICAL CABLE

The Nautilus was built by General Dynamic Corporation's Electric Boat Division shipyard, at Groton, Conn. She was launched on January 21, 1954.

Very frankly, we cannot recall a more *critical* application of electrical cable than this new atomic-powered submarine. And from one end to the other, this amazing boat is laced with Tiger Brand Electrical Cable.

But here's the important thing—*you* can get the same quality that went into the Nautilus. Just call your American Steel & Wire salesman.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL
GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB!

paper & varnished cambric cable
asbestos wire and cable
shovel & dredge cable
mold cured portable cord
machine tool & building wire
special purpose wire & cable
aerial, underground & submarine cable

USS Tiger Brand ELECTRICAL WIRE & CABLE USS

UNITED STATES STEEL

NEW NICOPRESS NO. 88 TOOL with

INTERCHANGEABLE HEADS ARE QUICKLY ATTACHED

INTERCHANGEABLE HEADS

● This mechanical tool develops tremendous power by a combination of compound leverage and progressive ratcheting action. A few short strokes of the easy-working handle produce the powerful jaw pressure necessary to assure dependable full-tension splices.

Quickly-changed tool heads permit splicing a wide range of larger conductors. Write for Bulletin 88.

NICOPRESS . . . the tool and the sleeve that are made to work together . . . *together* they make the perfect splice.

Nicopress Sleeves and Tools Patented in U.S. and Foreign Countries. "Nicopress" Registered in U.S. and foreign countries.

The National Telephone Supply Company

5100 SUPERIOR AVENUE • CLEVELAND 3, OHIO

Canadian Mfr.: N. SLATER CO., LTD., HAMILTON, ONTARIO, CANADA

Export Distributor: INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

THE NATIONAL TELEPHONE SUPPLY COMPANY

PROJECT SERVICE REPORT

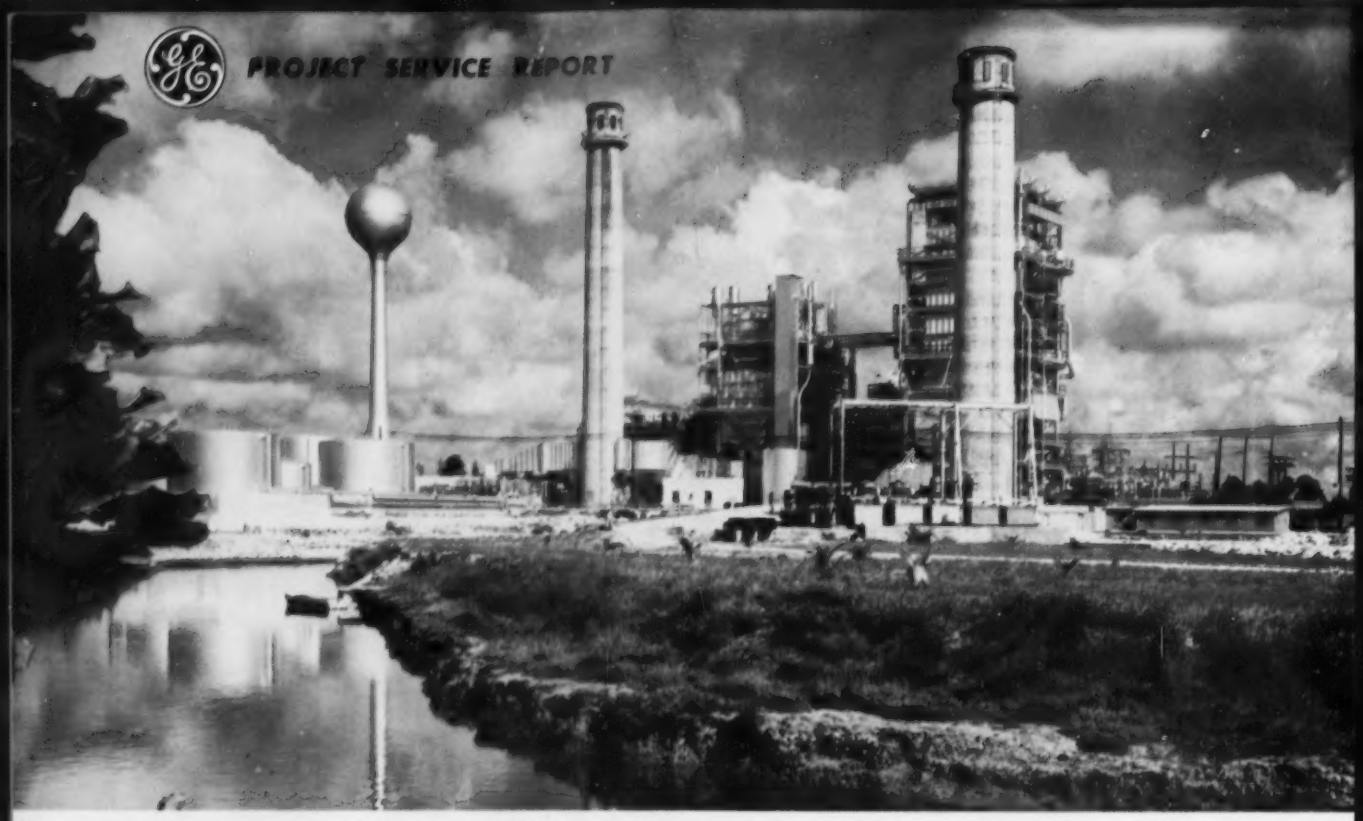
On-time start-up at Cutler station underscores how . . .

G-E teamwork can help meet operation schedules, lower power plant costs

When Florida Power & Light and Ebasco Services selected General Electric apparatus for expansion of the Cutler Station near Miami, they soon realized the value of having a G-E project team to help them. G-E Project Service will help keep plant construction costs to a minimum, and help meet start-up schedules and operating commitments through on-time apparatus shipments.

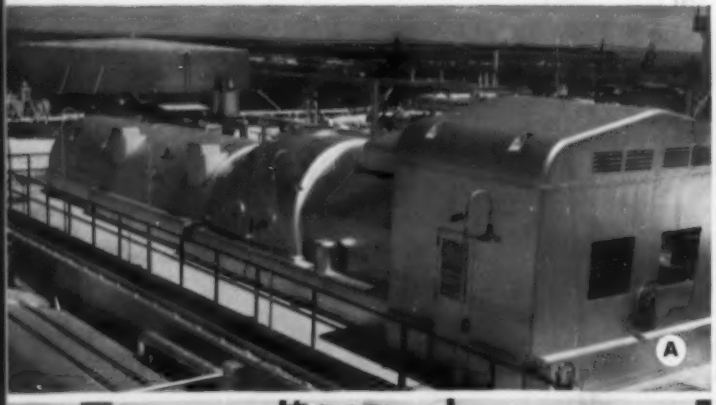
To get full details on how you can benefit from G-E Project Service, contact your nearest G-E Apparatus Sales Office. For further data on how this service paid off for Florida Power & Light in expanding its Cutler Station, see the following pages.

GENERAL ELECTRIC



TWO G-E TURBINE-GENERATORS PRODUCE 130,000 kw at Cutler Station of Florida Power and Light Co., Miami, Fla., to handle rapidly increasing industrial and residential loads of this growing area. Throughout construction, F. P. & L. and their consultants, Ebasco Services, Inc., received consolidated project reports on manufacturing details and shipping dates of all major electrical equipment.

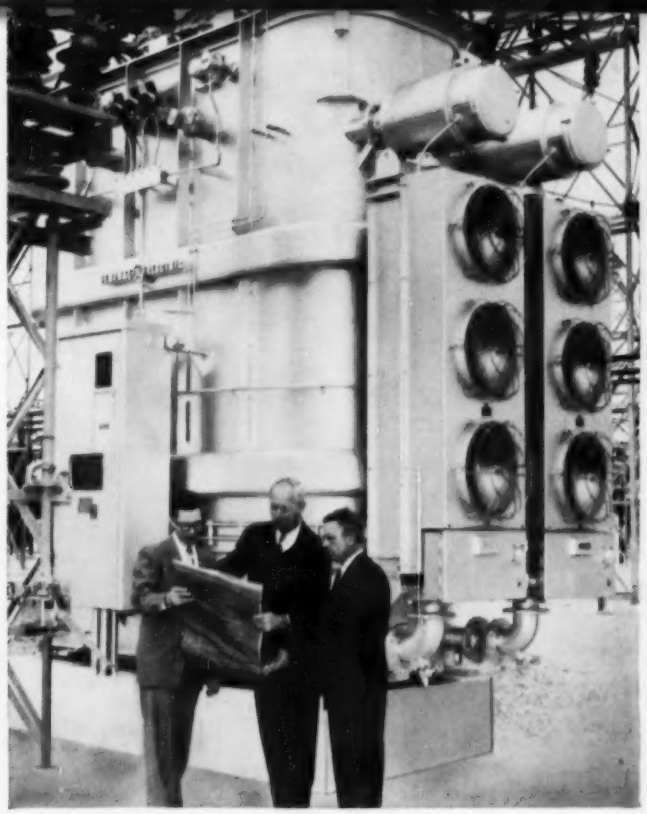
General Electric helps Florida P. & L. keep



A TURBINE-GENERATOR, 80,000 kilowatts, the newest G-E unit at Cutler Station, is tandem-compound, double flow, 3600 rpm. Manufacturing time was kept to a minimum since early planning reserved factory space.

B ADDITIONAL CAPACITY is already on order for F. P. & L. to meet Florida's rapid growth. President R. H. Fite (center) of F. P. & L. discusses the installation of a new 135,000-kw G-E unit (going in service next year) with J. W. Lacy, G.E., and H. V. Street, F. P. & L's. Chief Engr.

C SYSTEM REQUIREMENTS are discussed by F. P. & L.'s H. W. Page (left), Manager Power Supply and George Kinsman, Vice President. Early planning with G-E Project Team helped F. P. & L. meet growing power requirements on time.



MAIN POWER TRANSFORMER is forced-oil air-cooled, 42,500 kva. L. H. Hill, Jr. (left), G-E Transformer Specialist, E. J. Pearch, Station Supt. and J. W. Lacy, Jr., G-E Office Manager, discuss time saved by upright shipment in one-piece tank.

EBASCO SERVICES confers in New York with G-E Sales Engineer W. Luxton. Left to right: F. A. Ritchings, Chief Mechanical Engineer, W. H. Colquhoun, Engineering Manager, Mr. Luxton, and H. L. Lowe, Chief Electrical Engineer.

OUTDOOR SWITCHGEAR connections are reviewed by E. A. Bird, Ebasco Const. Supt., W. J. Blad, G-E Service Engineer, and Mr. Pearch. Project Co-ordination greatly simplified scheduling of numerous components.

ahead of growing power requirements

Project co-ordination by G.E. on 80,000-kw addition to Florida Power and Light's Cutler Station proves planning, teamwork pay-off

Cutler Station of Florida Power and Light, located near Miami, is an outstanding example of the utility industry's bold answer to the problem of sky-rocketing load growth in many areas. General Electric worked with F. P. & L. and its consulting engineers, Ebasco Services, Inc.—co-ordinating application engineering, product specifications, manufacturing and design cycles and scheduling of electrical equipment deliveries to help make sure the station went on the line on time.

In the expansion of this outdoor station, as in many stations throughout the country, Project Co-ordination has demonstrated its contributions to the planning, engineering, and successful operation of electric utility generating plants.

Such project co-ordination, combining the utility, the consultant and G.E.'s team of sales engineer, product specialists, application engineers and field service engineers, can save you time, money and man-hours. ***Here's how:***

SIMPLIFY ORDERING OF EQUIPMENT, purchased either directly, or through your consulting engineers, or through a machinery manufacturer.

CONSERVE ENGINEERING TIME by co-ordinating mechanical details which frees you and your consulting engineers for other urgent problems.

INTEGRATE EQUIPMENT DESIGN to insure the maximum flexibility and effectiveness of plant operation.

SPEED CONSTRUCTION by scheduling the arrival of equipment for maximum installation efficiency.

SUPERVISE INSTALLATION AND HELP TRAIN OPERATORS to insure minimum start-up time and better understanding of the full operating capabilities of the equipment.

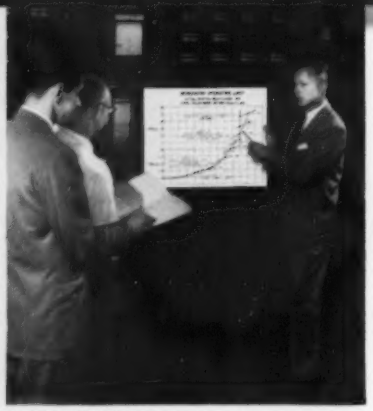
For details contact your G-E representative, or write Section 302-5, Apparatus Sales Div., General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

For More Data on How G-E Engineering Teams Work for You, See Next Page . . .

DISTRIBUTION PROBLEMS are quickly solved by portable d-c network analyzer. Developer J. F. Fuller, one of 41 district electric utility application engineers, works exclusively on utility problems.

ENGINEERING FORUMS explore latest developments and system trends, bring C. E. Kilbourne, generator engineer together with S. R. Folger, Philadelphia, and G. W. Walsh, headquarters, application engineers.



APPLICATION ENGINEERING services back up 325 sales engineers. H. C. Anderson, headquarters application engineer, explains maximum station output within stability limits.

BETTER SYSTEM PROTECTION, improved performance come from G-E Transient Analyzer studies. Here, A. J. Schulz, I. B. Johnson of G-E Analytical Engineering check effect of lightning surges on 100,000-kw generator.

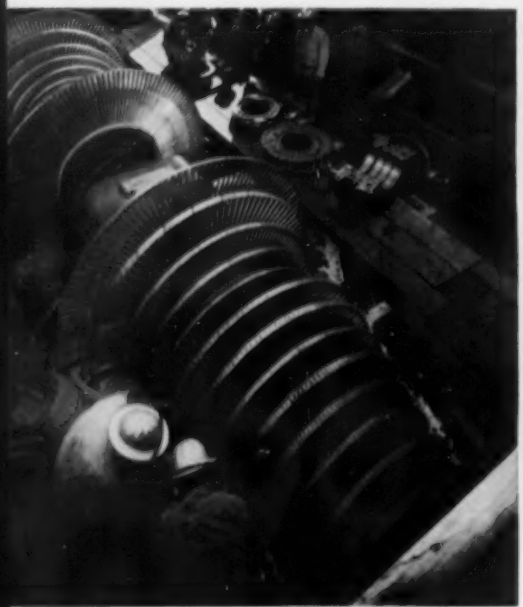
Here's how engineering teamwork helps utilities by

Translating creative thinking into profitable system operation

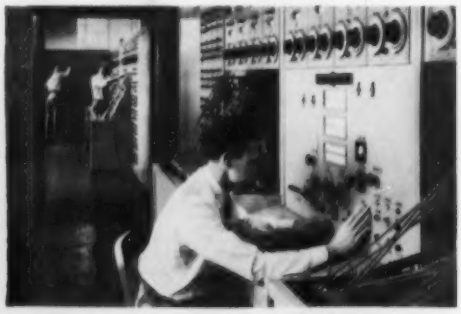
Co-operating with electric utilities and consulting engineers, General Electric's network of engineers is backed by the Company's vast resources. An application and analytical engineering center in Schenectady, for example, permits objective examination of creative new ideas and critical evaluation of projected system performance.

Continuing services by nearly 1000 G-E utility sales and engineering specialists are helping assure that today's bold investment in the future will be sound and profitable.

The practical working knowledge of G-E engineers, plus special analytical equipment and techniques, help electric utilities meet present and future power demands on a sound business basis. General Electric Co., Schenectady 5, N. Y.



FAST, PRECISE INSTALLATION is result of putting detailed planning into practice. For utilities, such planning by 200 G-E Field Service Engineers and 200 product specialists helps cut installed cost, speed start-up.



EFFICIENT SYSTEM PLANNING with G.E.'s two a-c network analyzers is made possible since units accurately predict characteristics of systems performance. These analyzers, individually or in combination, are in almost continuous use solving electric utility system problems.

ELECTRONIC COMPUTERS quickly analyze transmission loss studies to provide new information on economical utility system operation for F. J. Maginnis, Mgr.–Special Investigations and Dr. L. K. Kirchmayer.

MORE POWER TO AMERICA

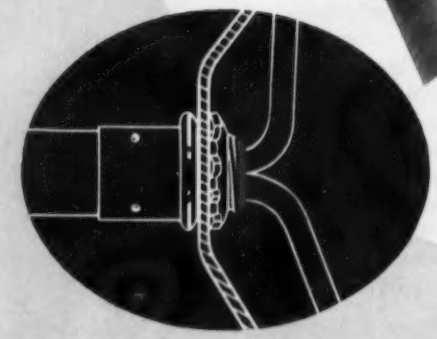
GENERAL ELECTRIC

Red Throat

B-M 21 B, THE NEW INSULATED THROAT INDENTER CONNECTOR FOR E. M. T.

Four Ways Finer

1. Protruding rounded red plastic lip of bushing prevents cutting of insulation—eliminates shorts.
2. Full thread screws into all conduit fittings. Lip of RED THROAT bushing protects thread from damage.
3. Deep dished eight pronged lock nut is easier to drive on—screws flush to shoulder and digs into metal of box for vibration proof positive ground.
4. Permanent locked-in bushing insures smooth burr-free raceway for easy fishing. No extra work and costs no more.



Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job!

ALL BRIEGEL FITTINGS ARE U. L. APPROVED AS CONCRETE-TIGHT

Order from Your Wholesaler!

All B-M Indenter Fittings are U.L. Approved as concrete-tight and for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

BRIEGEL METHOD TOOL CO.

GALVA • ILLINOIS

Warehouse Stocks in Principal Cities for Immediate Delivery!

SALES AGENTS FOR THE ELEVEN WESTERN STATES

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L. D. Hood Sales
1133 West 8th Avenue
Denver, Colorado

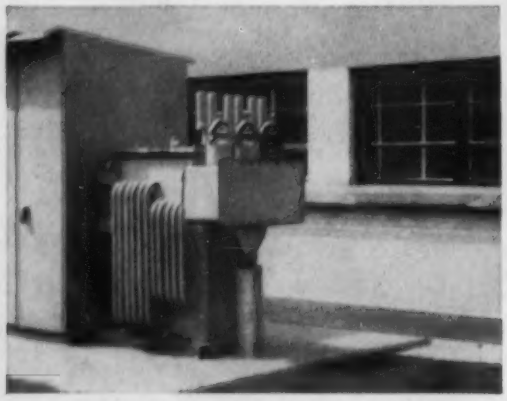
W. W. Wheat & Son
2219—4th Avenue
Seattle 1, Washington

PICK UP THAT LOAD

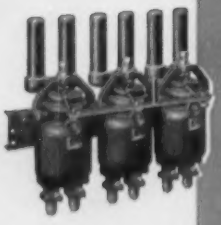
Protect your feeder with G&W type "FC" oil fuse cutouts

Combination Fuse-Switch—heavy all steel housing

provides safety to men and equipment



TYPE "FC" OIL FUSE CUTOUTS
2500—5000—8000 VOLTS TO GROUND



All steel enclosure, hermetically sealed—oil filled, protects men and equipment by safely withstanding high pressures of high voltage fuse clearing a heavy short circuit. In addition to the main purpose—a pressure tight enclosed fuse—the device serves as a full load break oil switch, three phase with gang-operated mechanism. Switching contacts are Beryllium copper. Fuse links are simple, inexpensive and easily replaced. Cable entrances are interchangeable—wiping sleeve, stuffing box or plain porcelain. Type "FC" cutouts are arranged for mounting on connection boxes, on steel structures or walls.

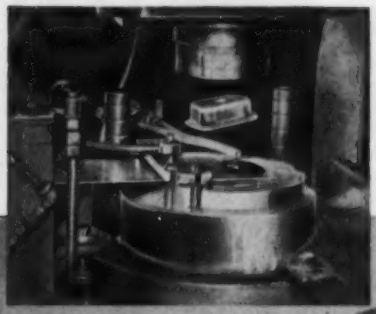
Write us or our representative for latest "CA" bulletin for further data

G&W ELECTRIC SPECIALTY CO.
7780 Dante Avenue, Chicago 19, Illinois
Representatives in principal cities of U.S.A.
In Canada—Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

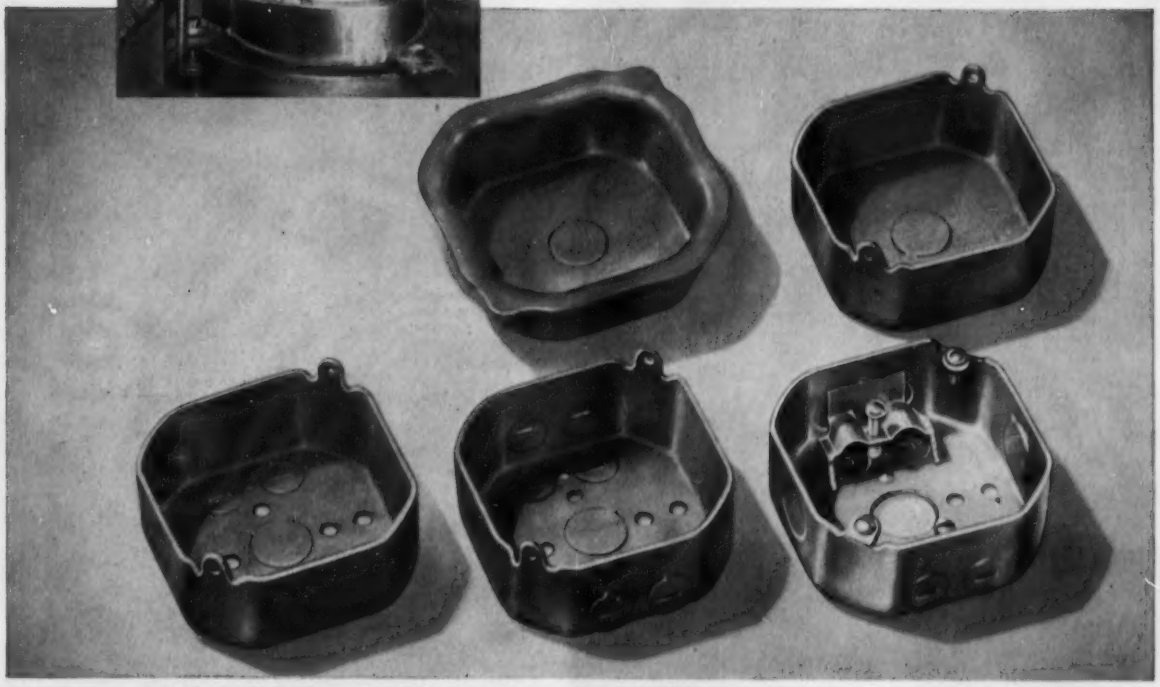
50th ANNIVERSARY G&W 1905-1955

C543

G&W



This 80-ton punch press makes the first medium draw in producing electrical outlet boxes; turns out approximately 12,000 units per day.



Whether or not you make electrical outlet boxes—

You can save money with the one right steel!

Using 14-gauge, hot-rolled coils from United States Steel, Bowers Manufacturing Company, Los Angeles, produces a wide variety of electrical outlet boxes. The photo above shows five steps in the fabrication of a box. After the initial draw, trim, and re-draw, the knockouts are formed and clamps and screws are installed. Finally, the outlet box receives an electro-galvanized plating. Using the one right steel enables this company to get more efficient production, fewer rejects, and results in money saved.

For every job, there is one particular steel that best suits the need. Evaluating your requirements and translating them into steel is our business. Isn't there some place in your plant where the one right steel could be saving you money today? One call to a Columbia-Geneva Technical Field Representative could be the answer to your problems.

Free!

UNITED STATES STEEL CORPORATION
COLUMBIA-GENEVA STEEL DIVISION
1403 RUSS BUILDING EW-3
SAN FRANCISCO 6, CALIFORNIA

Please send me your free wall chart, showing weights, standard sizes, and gauge of steel sheets.

*Name*_____

*Address*_____

*City*_____ *State*_____

USS

USS Steel Sheets

UNITED STATES STEEL

Helping the industry meet its growing loads

Leading the shift to new ASA standards with proved bushing design

The electrical industry has pushed toward constantly increasing standardization of equipment for reasons based on many sound operating economies. The recent ASA bushing standards are fresh evidence of this trend.

Westinghouse has recognized its responsibility to the industry in meeting these standards—with products of proved reliability—with the least amount of delay.

As a result, Westinghouse circuit breakers and transformers are the first available to the industry equipped with a bushing that fully meets the new standards. This bushing, the new Type S, retains the basic solder-sealed condenser construction backed by over 750,000 bushing years of service. It incorporates only minor dimensional changes over the previous design.

This quick response to industry needs is another record achievement of which we are proud and one which we believe reflects the long-term soundness of Westinghouse design aimed at meeting America's growing electrical load —economically—efficiently. J-97185

YOU CAN BE SURE...IF IT'S

Westinghouse

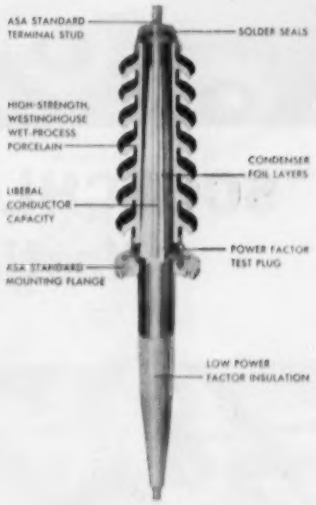
Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Industry interchangeability reduces spare parts inventory

Type S condenser bushings, now available, are designed to meet ASA mechanical standards for 23 kv through 69 kv, 400- and 1200-ampere ratings.

Basic design features unchanged

Condenser construction, pioneered by Westinghouse and backed up by over 50 years of experience, uniformly distributes voltage to prevent a concentration of stress at any one point. Complete hermetic seal, formed by soldering porcelain to flange and cap, eliminates all gaskets to assure a permanent seal against external contamination.



Now available

Westinghouse manufactures condenser bushings, from stud to porcelain, under closely controlled conditions using the most modern techniques. For best service, be sure to insist on them when purchasing breakers or transformers.

For more information, call your nearby Westinghouse representative or write direct to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

On all wiring in the $15,000,000 Beverly Hilton Hotel . . .

REG. U.S. PAT. OFF. REG. U.S. PAT. OFF.

SCOTCHLOK Connectors and SCOTCH Plastic Tape used exclusively!

DESIGNED by Welton Beckett, F.A.I.A., & Associates, the multi-million-dollar Beverly Hilton Hotel is now under construction in Los Angeles, California.

When C. D. Draucker, Inc., installed the wiring at the new 450-room Beverly Hilton Hotel in California, they wanted nothing but the best in materials. That's why they made all splices with "SCOTCHLOK" Brand Electrical Spring Connectors and "SCOTCH" Brand Plastic Electrical Tape.

"SCOTCHLOK" is the world's tightest-gripping wire connector. Just twist on, snap off winding stem and the splice is made! Steel-spring construction never shakes loose.

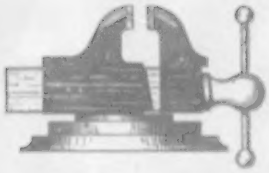
"SCOTCH" Brand Plastic Tapes are backed by a polyvinyl chloride film which resists sunlight, moisture, alkalies, oil and acids. The backing also provides excellent dielectric strength and abrasion resistance. All "SCOTCH" Plastic Tapes conform well to most surfaces . . . and a little tape goes a long, long way.

Other "SCOTCH" *Brand Electrical Products are Glass Cloth Tape No. 27,* "SCOTCHFIL" *Insulating Putty and* "SCOTCHKOTE" *Electrical Coating.*

REG. U.S. PAT. OFF.
SCOTCH BRAND **Electrical Insulating Products**

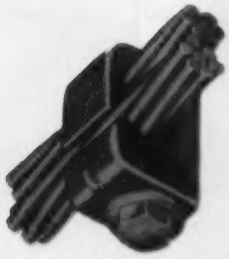
The term "SCOTCH" and the plaid design are registered trademarks for the more than 300 pressure-sensitive adhesive tapes made in U.S.A. by Minnesota Mining and Mfg. Co., St. Paul 6, Minn. —also makers of "SCOTCH" Brand Magnetic Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. Export Sales Office: 99 Park Avenue, New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

ALL FARGO CONNECTORS* are "VISE-TYPE"



VISE TYPE?

. . . small proportion of applied wrench torque dissipated in friction to overcome connector distortion . . . high compressive force developed between conductors . . . vise type design protects bolt from weathering and joint sealing compounds — long thread engagements eliminates "stripping" . . . vise design makes possible one-piece connector—no loose parts to handle—no parts to engage during installation . . . built like a vise, grips like a vise.



5000 SERIES

. . . 5000 Series is a cast bronze one-piece connector giving maximum flexibility of wire sizes . . . available in 12 sizes covering range from #8 through 1000 MCM—permits most economical selection of connectors for your system.

8000 SERIES

. . . 8000 Series is a wide range bronze or plated bronze connector for use on distribution systems . . . spacer bar gives additional contact area between conductors and protects against galvanic corrosion in copper to aluminum joints . . . four connectors cover range from #8 to #4/0 ACSR.

9000 SERIES

. . . 9000 Series has extra wide contact areas for maximum conductor encirclement . . . well rounded corners minimizes danger of nicking conductor.

. . . thick, pure aluminum spacer when under pressure forms around the strands of conductor sealing out moisture or other corrosive media—reduces danger of electrolyte bridging gap between copper and aluminum conductors.

. . . cast in aluminum . . . available to handle aluminum to aluminum or aluminum to copper connectors from #8 through 500 MCM . . . plated connectors of same design are available for all purpose use.

Ask your Line Material Field Engineer for complete details.

*Patented

FARGO

Manufactured by

FARGO MFG. COMPANY, INC.

Poughkeepsie, N. Y.

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LINE MATERIAL COMPANY

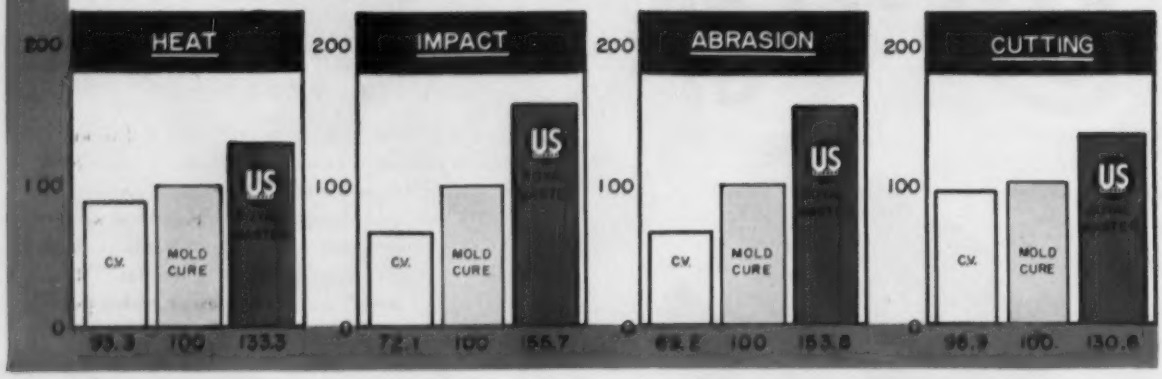
(A McGraw Electric Company Division)

Milwaukee, Wisconsin

LM

STARTLING

Comparative performance of portable cords related to major life factors.



New U. S. ROYAL MASTER portable cord

PROVES SUPERIOR TO ALL OTHERS IN EVERY SERVICE FACTOR!

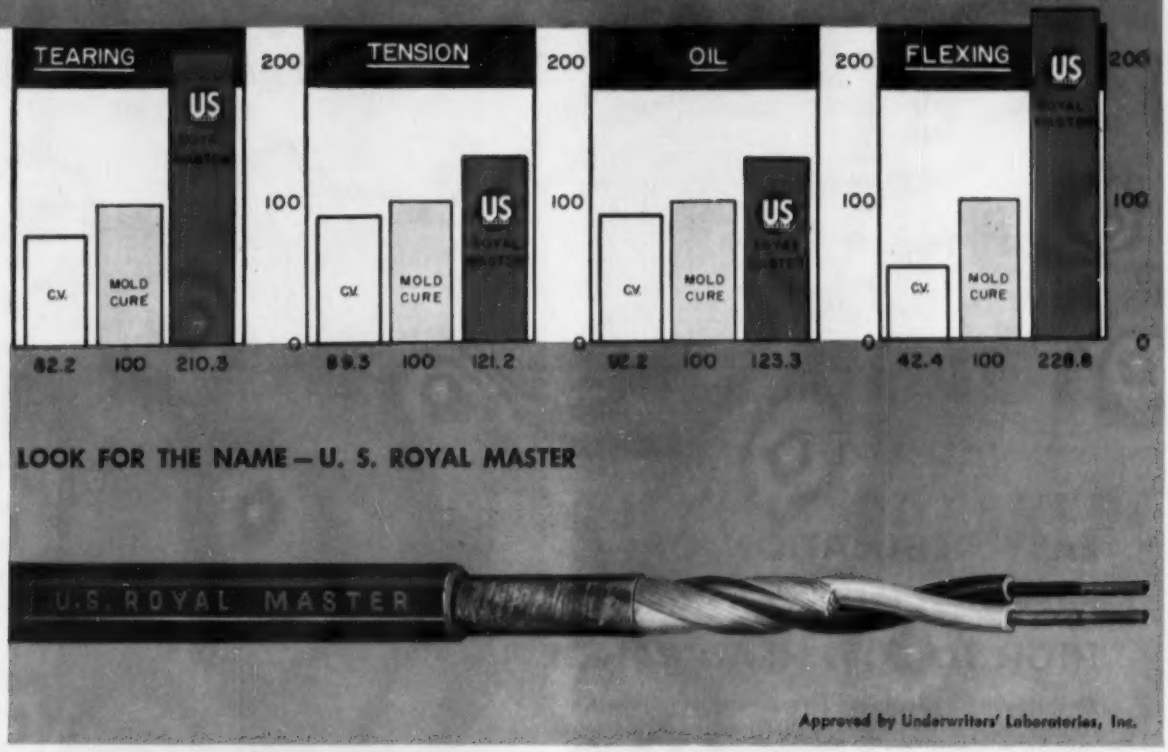
Newly developed U. S. Royal Master Cord gives almost twice the service of other molded cords — gives $1.88 value for every cord $1.00!

Life factor charts illustrate outstanding superiority of new U. S. Royal Master over the average of both the molded cords and the short-lived continuous vulcanized cords of other makes.

US RUBBER

UNITED STATES
ELECTRICAL WIRE & CABLE DEPARTMENT

EVIDENCE!



Cord construction completely reexamined. Over two years ago, U. S. Rubber engineers began a thorough reexamination of electrical cord design and construction. More than a thousand cords, including those of all major competitors as well as our own U. S. Royal Cord, were thoroughly and painstakingly analyzed. Over 10,000 tests were made to determine the principal causes of cord failure.

Every possible life factor was carefully and honestly appraised to find its relation to overall cord service.

With the findings at hand, "U. S." Engineers then drew upon their 64 years of experience in the manufacture of fine quality wire and cable to produce this exceptional new cord.

Every fault uncovered by the exhaustive two-year testing was tackled and solved.

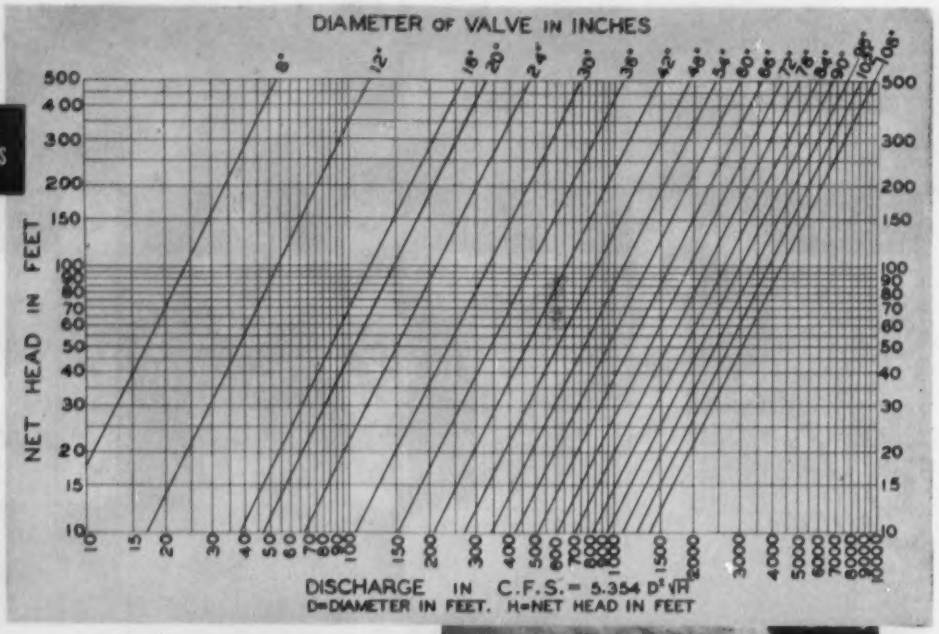
Tested and proved. The new U. S. Royal Master was then tested against all competitive cords—installed in outside plants for final on-the-job corroboration.

U. S. Royal Master Cord proved itself to be unquestionably the finest cord you can buy! So superior, it gives almost double the service life of the average of competitive molded cords—actually gives you $1.88 in value for every cord dollar!

Prove for yourself the phenomenal superiority of U. S. Royal Master. Write to address below for FREE descriptive booklet illustrating the superiority of the U. S. Royal Master Cord. And get in touch with your "U. S." distributor today!

RUBBER COMPANY
ROCKEFELLER CENTER, NEW YORK 20, N. Y.

SMS
HOWELL-BUNGER VALVES



EASY REGULATION OF FREE DISCHARGE THROUGH HIGH TO LOW HEAD RANGE

SMS Howell-Bunger Valves provide easy regulation and control of water under free discharge. Tremendous amounts of energy can be dissipated with a minimum of erosion, cavitation and no vibration. Because of this valve's high discharge coefficient, pipe line or conduit size can be held to a minimum for economical construction.

The extremely rugged and simple design of the SMS Howell-Bunger Valve provides these essential features:

- Free discharge with safe energy dissipation
- Hydraulic balance without vibration
- High coefficient of discharge for an energy dissipating valve
- Minimum cavitation and maintenance
- Simplicity of operation
- Only one moving part in contact with stream flow
- Low initial cost
- Discharges into atmosphere or submerged.

S. Morgan Smith Company offers you more than 75 years experience with hydraulic equipment. The SMS name plate is your assurance that performance will equal or exceed specifications. For full information on Howell-Bunger Valves, turbines and related hydraulic equipment write the S. Morgan Smith Company, York, Pennsylvania.

Hydraulic Turbines
Pumps
Gates & Hoists
Trash Rakes
Accessories

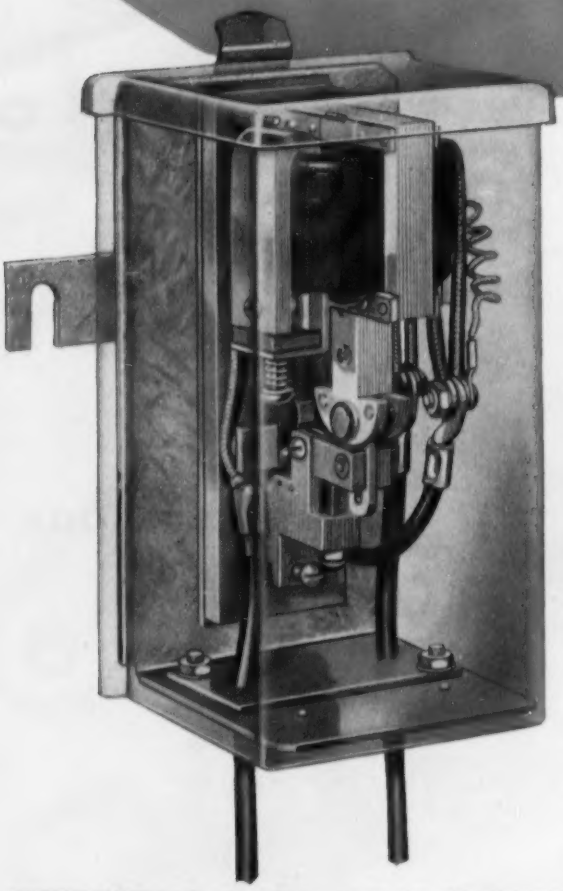
HYDRODYNAMICS

Rotovalves
Ball Valves
Butterfly Valves
Free-Discharge Valves
Controllable-Pitch Ship Propellers

SMS
S. MORGAN SMITH CO.

AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED, TORONTO

Take full advantage of banked secondaries...

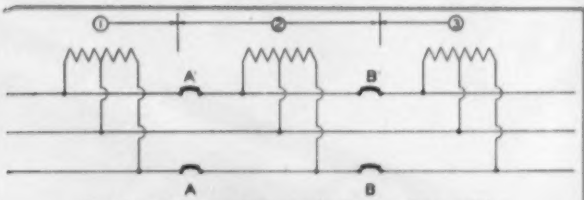


Restore service Automatically with KEARNEY *Secondary* CIRCUIT BREAKERS

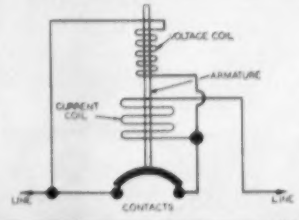
The fundamental advantage of banking transformers on a secondary is to distribute the load over several small units rather than force each transformer to handle the load in its immediate location.

Kearney Secondary Circuit Breakers make secondary banking practical and profitable. They are normally installed at points of minimum current interchange between transformers. When a fault occurs in one section, adjacent breakers open to protect unfaulted sections. When the fault clears itself, the breakers automatically reclose and restore service. On permanent faults, the breakers remain open, isolating the faulted section to prevent cascading of the outage to unaffected circuits.

Write today for descriptive information.



Portion of a typical banked secondary with sectionalizing breakers AA' and BB' installed



Internal wiring details of the breaker showing potential and current coils

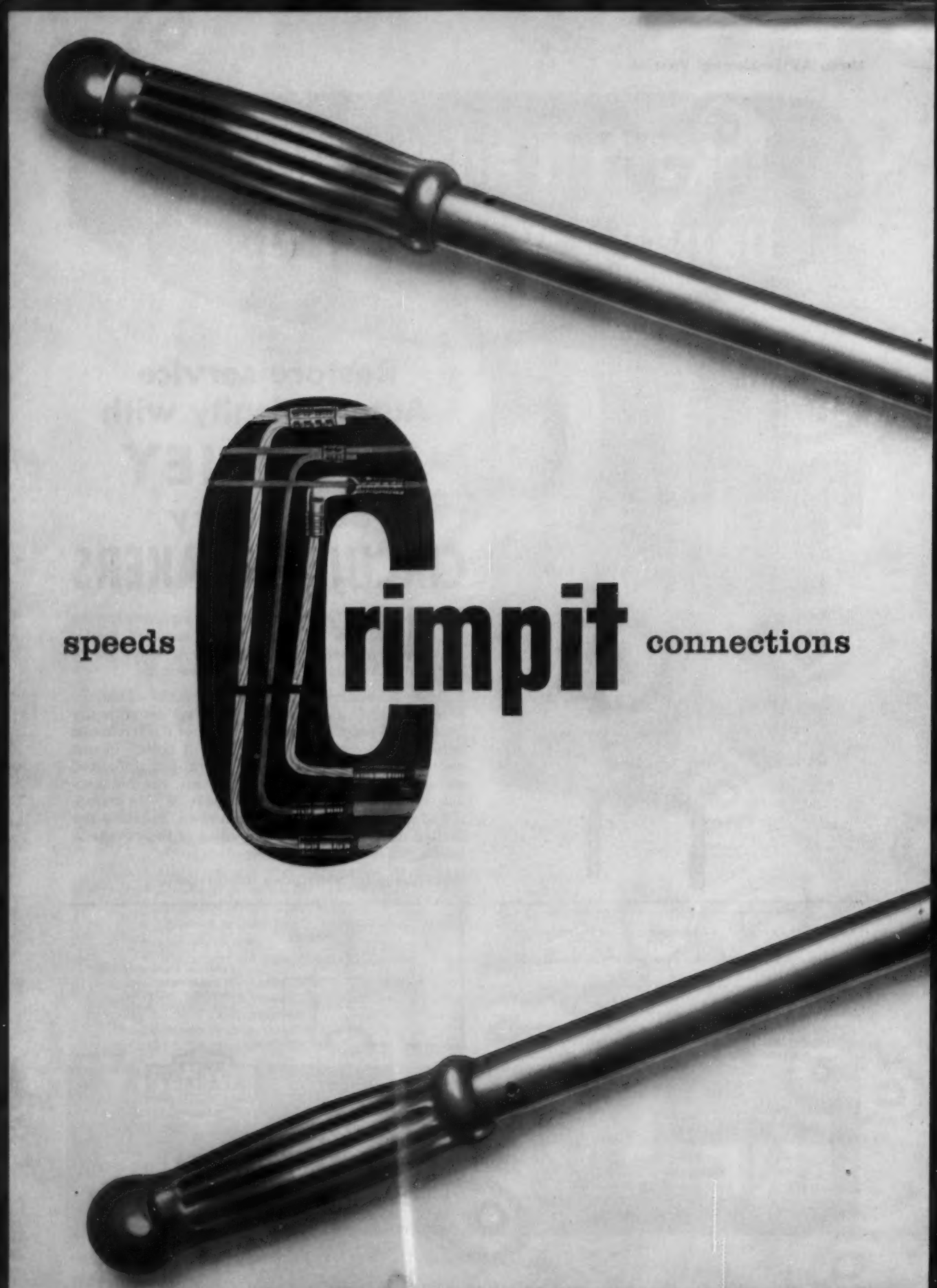
JRK 282W

For Better Construction...Safer Maintenance

Specify **KEARNEY** *The Mark of Quality* **PRODUCTS**

JAMES R. KEARNEY CORPORATION, ST. LOUIS, MO.

MAYDWELL & HARTZELL, INCORPORATED • WEST COAST DISTRIBUTORS • Los Angeles • San Francisco • Portland • Seattle • Spokane • Phoenix


speeds
Crimpit
connections

Makes every overhead distribution connection up to 1/0 ACSR combinations!

MD3 HYTOOL

Only 24 inches long. Weighs **8 pounds**—delivers **9000 pounds** crimping force at a single stroke. Compound cam-and-toggle action delivers great force at start of stroke when requirement is greatest—with plenty of follow-through for smooth completion of connection, even on tap combinations involving sizes as large as #2 copper or 1/0 ACSR. Lightweight HYTOOL's four crimping grooves will install *every* connector in the CRIMPIT program—quickly and easily.

The Burndy CRIMPIT program is rapidly being adopted by leading utilities as the most practical and efficient method of making uniform, economical overhead connections. To implement the program, Burndy introduces this brand-new, inexpensive MD3 HYTOOL, a universal hand tool designed for *easy* lineman use.

Two special bulletins detail the engineering principles behind this new tool and the entire CRIMPIT program. Your Burndy representative will be glad to send you both—or write direct to BURNDY—Norwalk, Connect.; Toronto, Canada.

Factories: New York, California, Toronto.
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It's good business to connect with

BURNDY

04-36

...FIRST name in electrical connectors; tools; methods

KEEP YOUR CONDUIT JOBS ON SCHEDULE . . .
WHY YOUNGSTOWN BUCKEYE CONDUIT IS BETTER
Youngstown is the one manufacturer who makes rigid steel conduit from ore to finished product. This enables Youngstown to control the complete manufacturing process—your insurance that each length of "Buckeye" is made of top-grade steel.
Call your Youngstown distributor

Youngstown

BUCKEYE QUALITY YOUNGSTOWN SERVICE CONDUIT

●You can keep your jobs on schedule, avoid lost time and unnecessary overhead by relying upon your Youngstown Distributor for Youngstown Buckeye rigid steel conduit. You'll get the size and quantity of good steel conduit you want when you want it. Phone your Youngstown Distributor. He'll take care of your order promptly.

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

There IS a Difference!

Connectors may look alike but it's PERFORMANCE that counts

BLACKBURN CONNECTORS OUT-PERFORM THEM ALL

Because They Are . . .

BETTER MECHANICALLY

- Made of high strength duronze, a silicon bronze alloy stronger than structural steel.
- Machine cut threads, *CFC treated, provides more thread engagement —reduces friction and increases thread efficiency. *Chemical Friction Control.
- Rigid inspection of each production operation assures uniformly good connectors.

BETTER ELECTRICALLY

- High clamping force—the result of greater thread efficiency breaks down oxide on the conductor improving conductivity.
- Higher initial conductivity, actually greater than an equal length of conductor is maintained permanently.

REUSABLE

- Selection of proper high-strength, corrosion-resistant materials—plus precision workmanship and inspection—means Blackburn connectors may be used over and over.

AVAILABLE AT ELECTRICAL WHOLESALERS EVERYWHERE

BLACKBURN *Hi-Strength* **CONNECTORS**

Distributed on the West Coast by
GENERAL ELECTRIC SUPPLY CO.

JASPER BLACKBURN CORP., 35 Madison Street, St. Louis 6, Missouri • Phone MAin 1-2821

PRODUCT NEWS

Truck Power Source and Tools

(1) H. S. Watson Co., 1316 67th St., Emeryville, Calif.

The usefulness of pickup trucks is claimed to be increased by a new rear power source and adapted tools designed by this manufacturer. Not a power take-off, the rear power source is adaptable to most light- and medium-duty trucks, and is available in kit form.

Most recent tool developed for the power source is a lightweight post hole digger. The digger is controlled by a hand clutch and is equipped with a slip clutch for extra operating safety. The digger is said to be capable of digging 10-in. holes to a depth of 40 in. at any point within a 4x8-ft area without moving the truck.

Pole Tongs

(2) Hogg and Davis, 2590 E. 67th St., Long Beach, Calif.

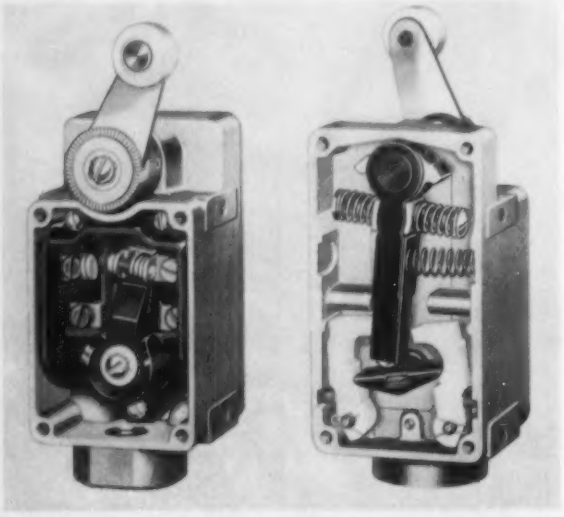
Trip line operation by the hoist or crane operator is a built-in safety feature of these pole tongs. The same device is reported to accelerate pole or timber handling by as much as 50%.

The tool, which is said to have a compression of 38% of the lifted object's weight, is made in two sizes. No. 20 has a 10,000 lb capacity, 11½ in. opening and weighs 20 lb. No. 30 has a 20,000 lb capacity, 16 in. opening and weighs 30 lb. Both are manufactured of high-tensile, 67,000-psi steel.

Wire Insulating Enamel

(3) Chemical Materials Dept., General Electric Co., Building 77, River Road, Schenectady, N. Y.

A new wire insulating enamel said to withstand 155 C for 3,000 hours without loss of dielectric strength is now available from this manufacturer. It is stated the life-test data indicate this heat resistance will permit design of electrical equipment with increased ratings and greater compactness. The new enamel is called Alkanex.



Limit Switch

(4) Clark Controller Co., 1146 E. 152nd St., Cleveland 10, Ohio.

A new heavy-duty machine limit switch designed for long life with minimum maintenance and greater ease in wiring has been introduced by this company.

Features of the type DM machine limit switch include increased wiring space, protection against excessive overtravel achieved without shear pins, complete separation of electrical and mechanical components, and nylon-to-steel wearing surfaces.

The switch is rated at 10 amp continuous capacity up to 600 v a-c, 550 v d-c. Available with ½- or ¾-in. conduit connectors.

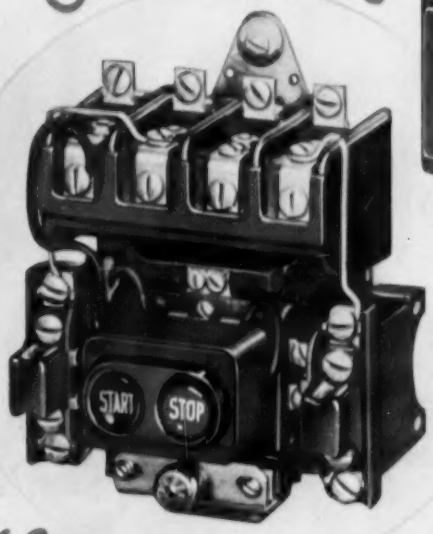
For Additional Information Fill in the Coupon on Page 54

BULLETIN 609—
Max Rating: 5 hp,
220 v; 7½ hp,
440-550 v.

Manual or Automatic

Bulletin 609

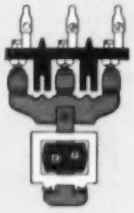
BULLETIN 709—
In 8 sizes up to 300
hp, 220 v; 600 hp,
440-550 v.



Bulletin 709—Form I

CONTACTOR OPEN

CONTACTOR CLOSED



DOUBLE BREAK, SILVER ALLOY CONTACTS

The silver alloy used for Allen-Bradley double break contacts remains always in perfect working condition. Hence, there is no need for contact maintenance. You can install an A-B starter and forget it.

The MOST POPULAR MOTOR STARTERS Trouble Free . . . No Contact Maintenance

These two Allen-Bradley across-the-line motor starters . . . Bulletin 609 manual and Bulletin 709 magnetic . . . enjoy world-wide popularity because no matter what the service may be, they will not fail.

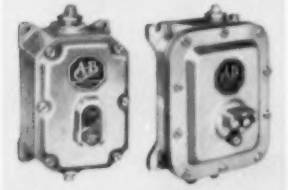
Both starters are simple, assuring long, trouble-free life. Both provide dependable overload protection to the motor. Both are push-button operated . . . one, mechanically through a snap-action linkage, and the other, electrically with a solenoid plunger.

For continuous plant operation, specify either Bulletin 609 manual or Bulletin 709 solenoid starters. For maximum protection to man, motor, and machine, the Bulletin 709 is best. Its "no-voltage" protective feature prevents accidental restarting of motors after power interruptions. Write for the A-B Handy Catalog —6th Edition.

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.

In Canada—
Allen-Bradley Canada Ltd., Galt, Ont.

ENCLOSURES for Every Operating Condition



NEMA type enclosures are available for Bulletin 609 and Bulletin 709 starters to satisfy any operating requirement.

ALLEN-BRADLEY

MANUAL AND AUTOMATIC STARTERS

QUALITY

2-55-RM

A QUALITY STARTING SWITCH for SMALL MOTORS

Providing Reliable Overload Protection

With linkage lever & pilot light.

With standard lever & pilot light.

3-Way selector & pilot light.

With removable key switch.

NEMA Type 7 enclosure for hazardous dust or gas conditions.

NEMA Type 4 enclosure for watertight & weatherproof service.

BULLETIN 600 MANUAL STARTER

for Motors of 1 Hp or less

This compact toggle switch with a built-in overload breaker satisfies the National Electrical Code (Para. 4322 sub. C) covering overload protection requirements for motors of 1 hp or less.

QUICK MAKE & BREAK CONTACTS—The simple, rugged, over-center mechanism has a quick make and break action. No "teasing" of contacts means long contact life.

GENEROUS WIRING SPACE—Cover slips off, exposing front and both sides.

ATTRACTIVE APPEARANCE—The clean, modern lines are a sales asset to any machine. Enclosures listed for every service.

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.

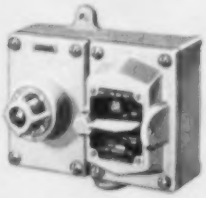
In Canada—
Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY
TROUBLE FREE MOTOR CONTROL
QUALITY

Flush mounting of two Bulletin 600 starters, each with a pilot light.

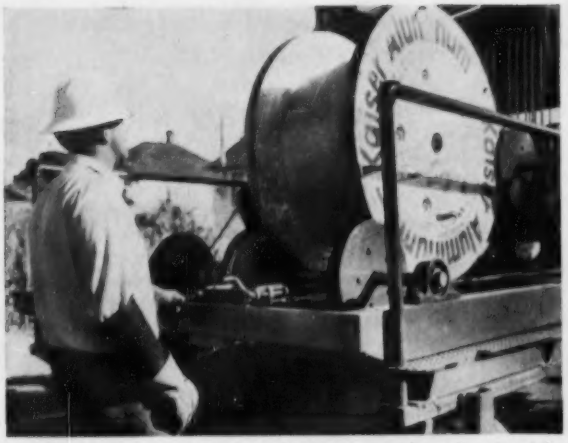
In a standard switch box.

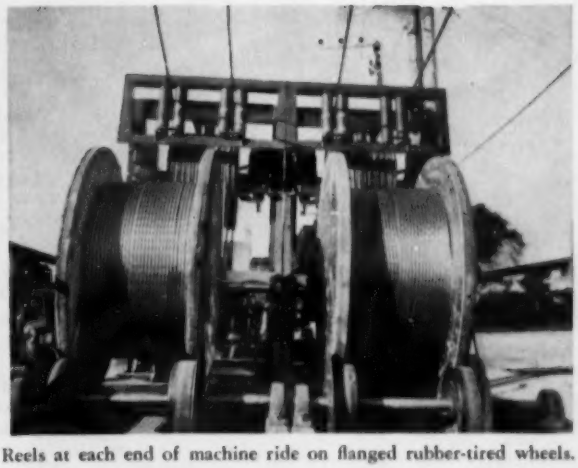
In a surface mounted box.



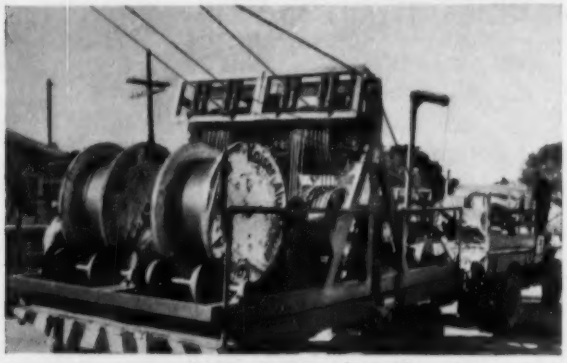
NEMA Type 4 enclosure with pilot light for use in wet locations.

2-55-RM





Attendant regulates tension (left) by means of cranks. At right: Reels at each end of machine ride on flanged rubber-tired wheels.



Four pairs of grooved bull wheels (left) hold tension. Right: Tension is so uniform that conductors are tied in without sagging.

Wires Strung Under Tension

Advantages of stringing several transmission or distribution conductors under tension at the same time are so great that there is now a definite trend in that direction.

The first equipment of this kind to be used by Pacific Gas and Electric Co. was employed recently in stringing a 266,800-cir-mil, all-aluminum 22-kv line at Pacific Grove, Calif. The device, made by the Petersen Engineering Co. of Santa Clara, Calif., is shown in the accompanying photographs.

This particular machine strings up to 4 conductors under tension up to 477 MCM, and is known as Series 5000. Series 6000 takes conductors up to 1 million CM, and Series 7000 to take conductors to 2" diameter is under development. As may be seen, there are four sets of grooved drums or "bull" wheels 26 inches in diameter, around each of which there are four wraps of the wire to prevent slippage. Grooves are neoprene lined to prevent damage to the conductor and further to insure against any possible slippage. Vertical rubber rollers guide the wire on and off the bull wheels.

On the shaft of each of the bull wheels there is a smooth acting brake of the type used for emergency braking on heavy earth-moving equipment. A small flexible steel cable leads from each pair of these brakes to a crank on the bed of the machine, giving perfect control over braking of the bull wheels.

An interesting feature of the design is the manner in which the reels of cable are supported. Two shafts with flanged rubber-tired wheels are ajustable so that the rim of any sized cable reel rides on these rubber tires. A brake on each shaft of the same type as that used on the bull wheels permits the degree of retardation necessary to keep the conductor under tension between the reel and the first bull wheel.

After a few pulls, an interesting thing develops.

The braking system permits such nicety of control over total tension in the conductors and relative tension between conductors that it is possible to dead-end and tie in directly without any sagging operation, thus effecting a considerable saving in time. Primary purpose of the tension stringing is, of course, to keep the conductors out of hot 4-kv primary and other circuits below. Even though there is little possibility of contact with hot lines with tension stringing, nevertheless the machine is grounded as a safety precaution.

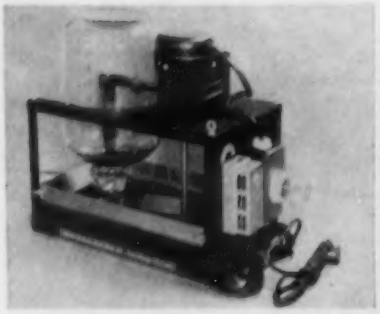
Those familiar with line construction predict that tension stringing will soon become general practice, even on new work where no other lines are involved.

Made by the makers of the World-Famous
PENGO EARTH AUGERS

PETERSEN
ENGINEERING COMPANY
Santa Clara, Calif.

Send Coupon for More Information!

PETERSEN ENGINEERING CO.
Santa Clara, California Dept. 3
Please send me more information on the new Pengo Tension Wire Stringer.
Name_____
Firm_____
Address_____
City_____ State_____



Poultry House Humidifier

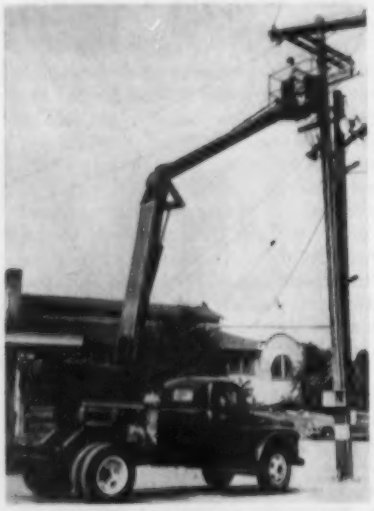
(5) Lyon Rural Electric Co., San Diego 12, Calif.

Automatic, trouble-free humidity control in poultry houses is aided by this new humidifier, according to the manufacturer. The unit is compact, has no valves or orifices, and a sealed-in oil reservoir on the motor minimizes maintenance of the unit, it is reported.

Solderless Lugs

(6) Ilsco Corp., Cincinnati 27, Ohio.

Solderless lugs with two holes for stabilized mounting are recent developments of this company. Made of electrolytic copper, the two models, VT and LO, are in six sizes covering from No. 14 to 1,000 MCM wire.



Aerial Platform

(7) Pitman Mfg. Co., 300 W. 79th Terrace, Kansas City 14, Mo.

An independently powered, self-contained aerial platform that can reach up to 40 ft is offered by this manufacturer. Called Giraffe, the lift reportedly supports 450 lb at any radius without outriggers, and can carry up to 1,000 lb if outriggers are used. It can be operated from the platform.

The hydraulically operated boom of the machine is constructed in two sections that can be moved independently or at the same time. It also features continuous rotation in either direction. The company states that the independent power source of the Giraffe can also double to operate a compressor or generator for power tools used from the platform. Electrical conduit and an air pipe are built into the boom for convenient access to the power source.

Safety features reported by the manufacturer include insulation against 7,500 v, seamless steel tubing for the hydraulic system and restrictors to control the rate of drop on the boom in case of hydraulic failure.

Indoor-Outdoor Heat Control

(8) Automatic Devices Co. Inc., Western Springs, Ill.

Maximum flexibility with simplified settings for easy adaptation to heating requirements of multiple - occupancy buildings are stated features of a new Weather-Man control made by this company.

A remote outside temperature bulb is connected with a regulator case installed indoors. Heat is controlled by a program dial that automatically controls heat input during the day, provides night setback and a morning build-up period. All adjust according to changes in weather.

Also featured, reports the manufacturer, is a manual Variator dial that can be positioned to variably increase or decrease the amount of heat flow in case of special requirements.

The control is said to operate with all types of fuel in all classes of buildings.

Pole Top Adapter

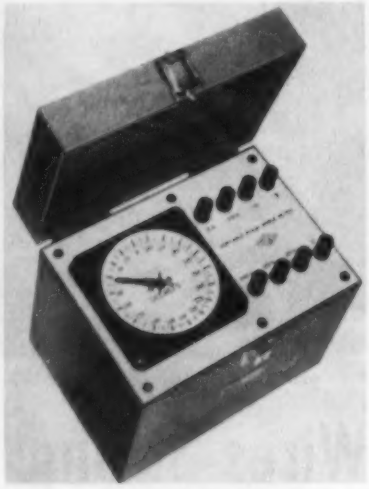
(9) Nepo Mfg. Co., 6025 N. Keystone Ave., Chicago 30, Ill.

For modernization of pole lighting equipment, a new adapter is designed to fit the top of any standard 2- to 4-in.-diameter pole. It is made of aluminum alloy and extruded aluminum arms support two mercury vapor transformers and two luminaires. It is furnished complete with poles or for existing poles. Interchangeability of parts makes it possible to provide either a single-arm or a twin-arm unit from the same basic castings, it is stated.

Instrument Tests Reclosers

(10) Multi-Amp Corp., 10 Third St., Newark 7, N. J.

An instrument for checking and calibrating reclosers at low voltages either before or after installation has been developed by this manufacturer. Known as Multi-Amp model 2040/ACTS, it automatically tests General Electric, Kearney, Kyle and Westinghouse oil circuit reclosers for minimum trip current, sequence operation and coordination. The portable instrument is rated at 4 kva and is available in models with inputs of 220 or 440 v at 60 cycle a-c. Output is adjustable in stepless increments.



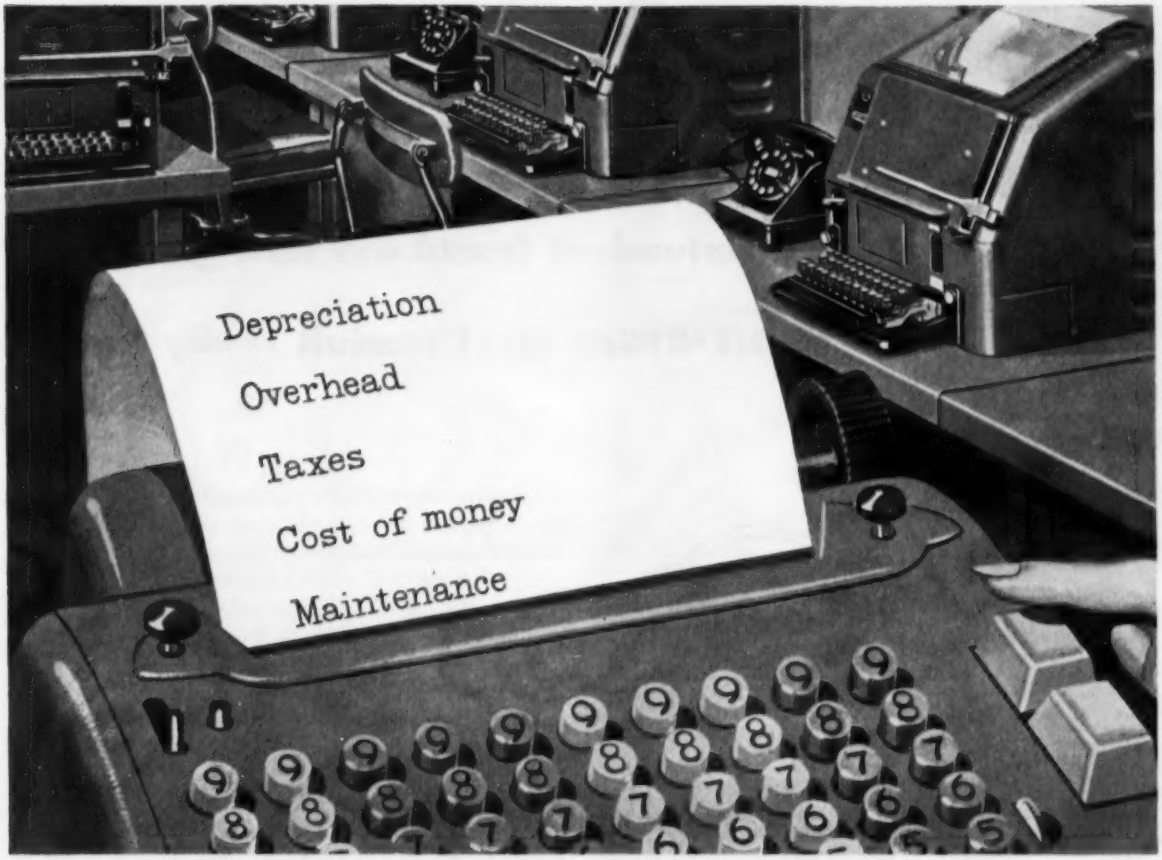
Portable Phase Angle Meter

(11) The Eastern Specialty Co., 3617 N. Eighth St., Philadelphia, Pa.

A simple and direct way to check relay and instrument connections is provided in this company's portable phase angle meter. The company reports that the meter quickly shows the phase relation between the current and voltage in any element of a meter or relay and is particularly useful in checking the connections or performances of directional overcurrent relays, differential relays or similar equipment. It also measures the prevailing power factor in each phase of a polyphase watthour meter installation.

The phase-splitting network associated with the potential circuit is mounted inside the carrying case, together with the multiratio potential and current transformers.

General specifications are: frequency, 60 cycles; voltage ranges, 60, 120 and 240; current ranges, 1, 2.5 and 5 amp.



If you provide your own communications system...

HAVE YOU ADDED UP ALL THESE COSTS?

Owning and operating your communications system can be a costly experience, with many costs frequently overlooked. Depreciation, taxes, overhead, maintenance, loss of interest on capital all contribute to your total communication expense.

Bell System communications are low in cost. You pay only a fixed monthly charge for services and facilities tailored to your exact needs. No more, no less. Your capital is not tied up but left free for income-producing investments in *your* business.

The installation of your communications is just the beginning of the Bell System job. Maintenance, replacement, inventory, storage, extension and rearrangement are all handled rapidly and efficiently—no longer problems for you.

Let us show you how Bell System know-how and experience can be put to work to solve your communications problems. For a complete communications study, made without charge, call your local Bell Telephone representative today.

TELEPHONE

TELETYPEWRITER

MOBILE RADIO

METERING CHANNELS

BELL TELEPHONE SYSTEM

This superintendent found out how good

ROME•RIGID steel conduit really is

The superintendent of a large west coast electrical contracting firm found that he could not flake off the galvanizing on ROME • RIGID conduit.

He was bending 1" conduit by hand, but the radius he wanted did not quite come off. So he bent the conduit back and forth *four times* before he was satisfied.

Then he grinned and said, "This is the first time in my experience that I have bent conduit this way without getting distortion or flaking-off of the galvanizing."

Well, Mr. Superintendent (and you, too,) there are some very sound reasons for this. The quality of ROME • RIGID is no accident. Take a quick look at the pains Rome Cable takes to make it a conduit you can install fast, easily, and at low cost . . . a conduit that will provide safe, corrosion-free protection for many years to come.

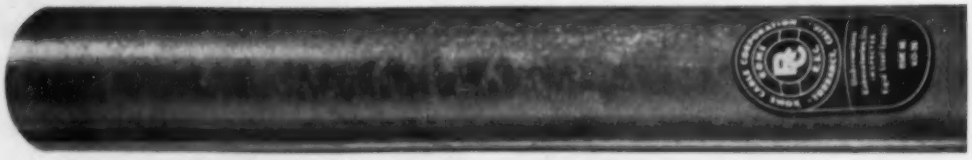
Mail the coupon to get the complete "Story of ROME • RIGID."

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA

IMMEDIATE DELIVERY!

Ample stocks of rigid and thinwall conduit in all sizes enable Rome Cable to give *you immediate delivery* of these quality products. Write or call us today.

ROME • RIGID is made in 10-ft. lengths with a coupling attached in diameters from ½" to 6". Extra couplings and elbows for this complete size range are available. Fully approved by Underwriters Laboratories, Inc., ROME • RIGID meets all requirements for safe steel raceway.



1 The Sendzimir hot-dip galvanizing process *requires* high quality hot-rolled sheet steel, free of heavy mill scale and pits found in "skelp" used in ordinary rigid conduit. We check thickness, hardness and surface quality constantly.

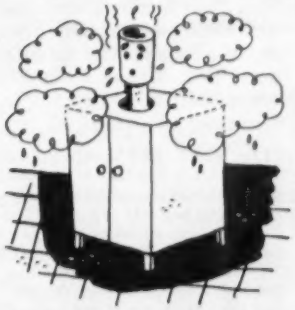
2 To further improve surface quality, we first run the full width of sheet stock through a shot blast. This completely removes all oxides, rust, roughness or dirt, leaving a uniformly clean surface. We then slit the stock to proper widths for the forming rolls which shape it into round pipe.

3 Cold forming maintains the uniform thickness of the steel. As the pipe is formed, electrical resistance welding such as is used in making high pressure boiler tubing, closes the seam with a superior joint.

4 Next, we remove any weld flash inside or out with a scarfing tool and inspect each length for straightness. Any that fail to meet this test, we put on the straightening machine.

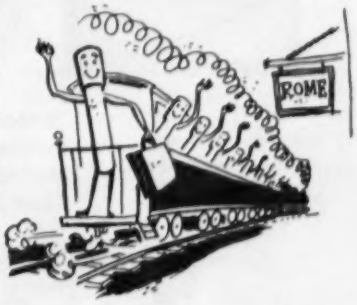
5 Now for the "hot dip." Rome finds the use of Armco Steel Corporation's patented Sendzimir galvanizing process feasible only because the sheet steel Rome uses for RIGID conduit provides the kind of surface this high quality process requires for successful application.

6 First step in the Sendzimir process involves preheating each length in a furnace which, under a carefully controlled atmosphere, burns off any dirt, oil or scale, inside and outside. This treatment produces a blue oxide which makes the inside pipe look like a gun barrel.

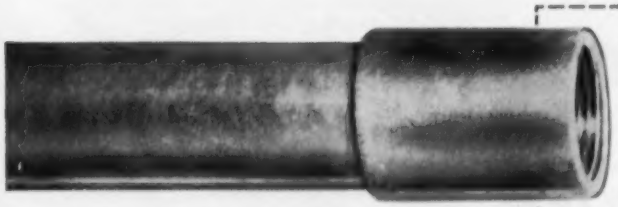


7 Next the pipe goes to a reducing furnace which performs two important functions. First, it anneals the pipe, providing a soft, ductile conduit which can be accurately bent. Then, it reduces the blue oxide to a mirror-smooth, stain-free surface.

8 Pipe is then discharged into a molten bath without being exposed to a temperature variation and oxidation. It requires no pickling or fluxing. The pipe is conveyed through a zinc bath, at controlled temperature and time which guarantee a uniformity never before attained in galvanizing rigid conduit.



9 ROME • RIGID is then lacquered inside and out and baked to smooth, hard coating to provide a slick, low-friction surface for easy pulling. 100% of the product then receives inspection, inside and out. Color-coded thread protectors and Underwriters label are applied, and the pipe is bundled for shipment.



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Please send me your new brochure, "The Story of ROME • RIGID."

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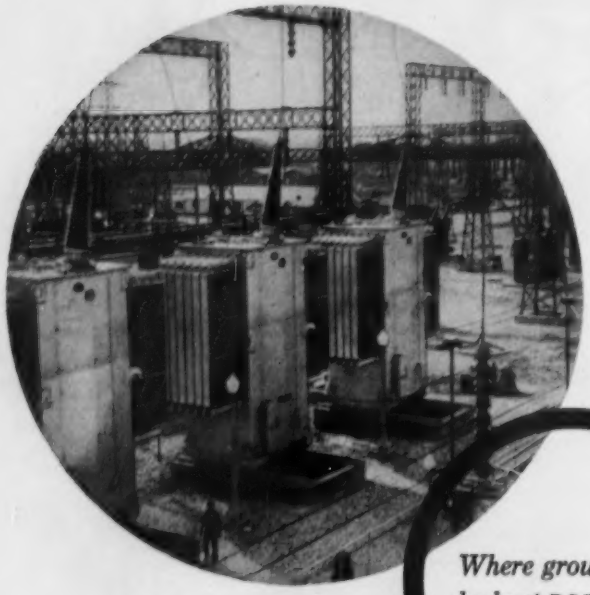

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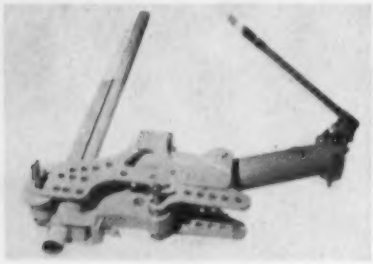


Combined Tube and Pipe Bender

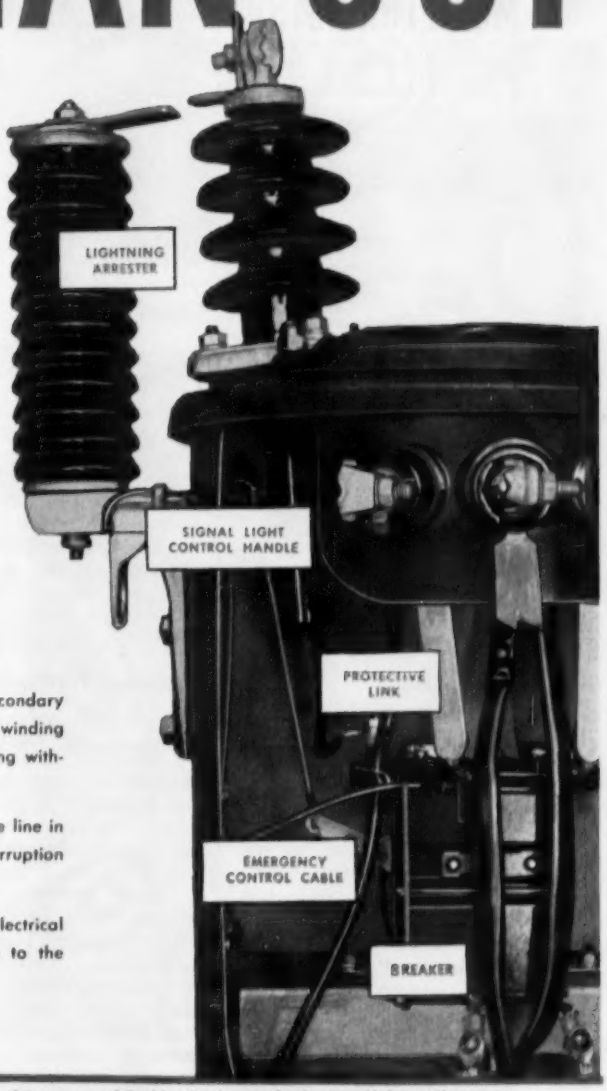
(12) Tal Bender Inc., Milwaukee 2, Wis.

A new frame for this company's One Shot Pipe Bender allows the portable tool to be used for both pipe and tubing of all kinds. The manufacturer reports that existing equipment can be converted.

(13) **TEST SETS**—Model 405A Hypot Junior rated 0-5,000 v a-c insulation test set for testing appliances and small electrical components by unskilled operators has been announced by Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill. Another addition to the line is a 45-kv d-c high-voltage test set designed for plant and laboratory use in testing wire and cable rated up to 15 kv, rotating machinery, insulating materials, etc. This model 437 can also be furnished in a completely enclosed steel case with shielded cable output leads for use in the field.

(14) **INSTRUMENTS**—A line of 4½-in. switchboard and panel instruments with clear plastic fronts and "in-line" pointers and dials is offered by Weston Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N.J. The plastic fronts on this model 610 are said to admit a maximum amount of light on the dial and to eliminate need for internal illumination under normal operating conditions. The pointer and dial eliminate parallax errors and permit accurate readings at an angle, it is stated. While the lower portion of the plastic front is normally black, other colors can be provided. Available in all types and ranges to meet all switchboard and special requirements. Scales are 3.5 in. long; rated accuracy 1% of full scale value; size 4x4½ in.

KUHLMAN CSP



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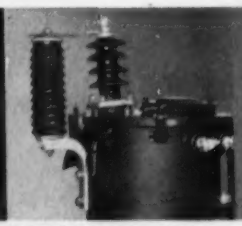
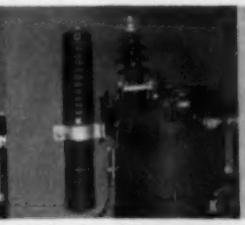
1. **Protects customer service** by signaling a warning in growing load areas before overloading occurs and providing for emergency overloads.
2. **Protects transformer life** by providing a secondary breaker that operates within the safe limits of the winding temperature and protects against unsafe overloading without sacrificing short-time overload capacity.
3. **Protects the line** by clearing transformer from the line in case of internal failure and preventing service interruption to the remaining transformers on the line.
4. **Protects against lightning** by safely bypassing electrical surges without interruption of service or damage to the transformer.

Optional Arrester and Bushing Equipment for Various Voltage Classes

Breaker Operating Handle with Warning Light and Emergency Control Lever.

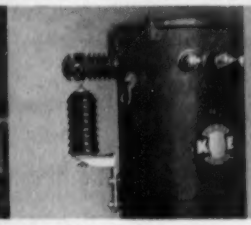


Expulsion Type Arrester with Isolating Gap.

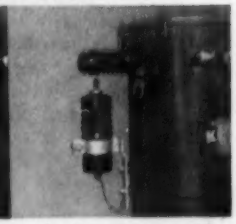


Valve Type Arrester with Isolating Gap.

Voltages above 5,000 Volts—Mountings Interchangeable.



Expulsion Type Arrester with Isolating Gap.



Valve Type Arrester with Isolating Gap.

Voltages below 5,000 Volts—Mountings Interchangeable.

165

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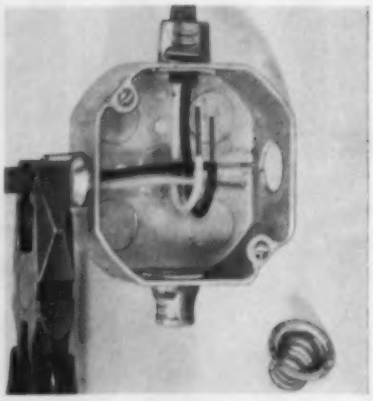


Connector

(15) Denman Products Co., 210 Bietz Bldg., Ravenna, Ohio.

This company announces a new low-cost connector that speeds the installation of nonmetallic sheathed cables in junction boxes. The Fast-On Connector, type No. 2, is made of rustproof aluminum alloy and is listed by Underwriters' Laboratories Inc. No special tools are necessary to crimp the connector onto the wire, and it fits various wire sizes.

Sectional Terminal Block

(16) Buchanan Electrical Products Corp., Hillside, N. J.

Designed to permit any number of circuit sections to be assembled securely into a compact 70-amp, 750-v sectional terminal block, Pres-Sure blocks have three basic parts; are available for several assembly methods.

These blocks utilize three integrally molded serrated pins that locate and secure each circuit section by mating with corresponding holes in the adjoining circuit section. They therefore can be assembled without accessory fastening hardware or loose fitting sections, according to the manufacturer, who states that the interlocking surface design also solves flashover and leakage problems.

Each circuit section is fully covered and is complete with a factory installed contact. Three contact types are available for stripped or terminal ended wire with a range of No. 18 through No. 4 wires. All contacts are plated electrolytic copper with positive wire stops.

The Pres-fit sections are available either factory assembled or in sections for user's assembly with pneumatically or manually operated assembly fixture. Slip-fit sections are available for user's hand assembly and disassembly. Blocks are supplied in various MIL-P-14 molding materials.

Compression Method

(17) Burndy Engineering Co. Inc., Norwalk, Conn.

A new compression method developed by this manufacturer for terminating and splicing square and rectangular magnet wire employs the manufacturer's standard pneumatic press with a special Magnecrimp die containing both rounding and crimping grooves. Single or bundled magnet wire is prerounded by the rounding dies and inserted into the tubular barrel of a standard Hydent compression connector, wire-and-connector assembly is then crimped together by the crimping die groove so that the magnet wire is completely encircled by the connector barrel.

According to the manufacturer, the Magnecrimp method insures the correct, most economical terminal or link size for the cross-sectional area of the magnet wire and provides a joint of maximum electrical efficiency and high mechanical strength. Magnecrimp die sets and connectors are available for solid, round, square and rectangular magnet wires in No. 26 through 2,000 MCM.

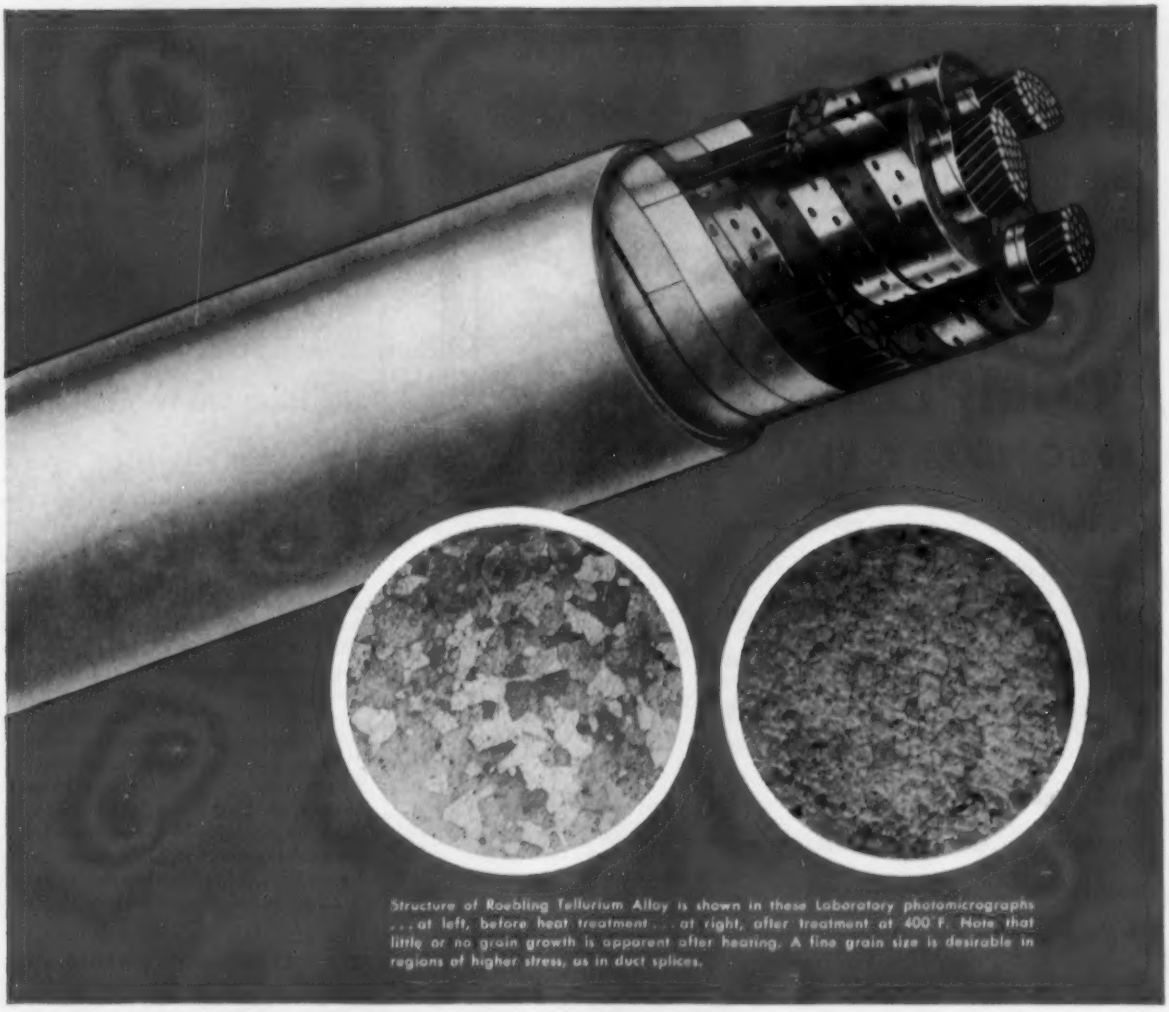
Voltmeter

(18) Hycon Mfg. Co., 2961 E. Colorado St., Pasadena 8, Calif.

A new line of high-precision instruments for circuit checking, testing or proving introduced by this company is headed up by its Digital Voltmeter, model 615. Equipped with an illuminated three-digit counter, the instrument is easily read without interpolation or parallax correction.

(19) STARTERS — Three-coil overload protection in the same enclosure is offered by Cutler Hammer Inc., Milwaukee, Wis., in a line introduced recently. Another feature is the adjustable heater coil permitting four different ratings from a single coil by changing its position. Publication EC-20 gives details.

ROEBLING TELLURIUM ALLOY LEAD SHEATH ASSURES FAR LONGER CABLE LIFE



Structure of Roebling Tellurium Alloy is shown in these Laboratory photomicrographs . . . at left, before heat treatment . . . at right, after treatment at 400° F. Note that little or no grain growth is apparent after heating. A fine grain size is desirable in regions of higher stress, as in duct splices.

BIGGER LOAD REQUIREMENTS! Higher temperatures! Increased movement of cable during load cycles! Today's best answer to each of these conditions is Roebling Paper Insulated Cable with Tellurium Alloy Lead Sheath*—the Roebling lead alloy that has completely superior resistance to fatigue.

In addition, Tellurium Alloy Lead Sheathed Cable has a lower long-time creep rate . . . high bursting strength . . . remarkable stability under heat application as in duct splicing and wiping. And on top of that, it eliminates need for frequent stop joints or reinforced lead sheath . . . does not require generous expansion bends or large manholes.

Write us now for full information. John A. Roebling's Sons Corporation, Dept. 707, Trenton 2, New Jersey.

*Licensed under Patent 2586095 March 4, 1952 and App. No. 308710, Sept. 9, 1952.

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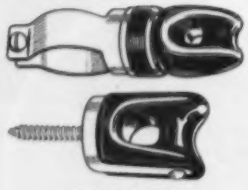

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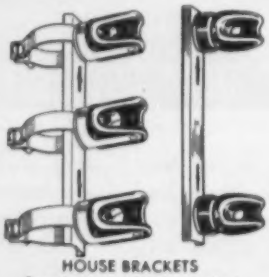

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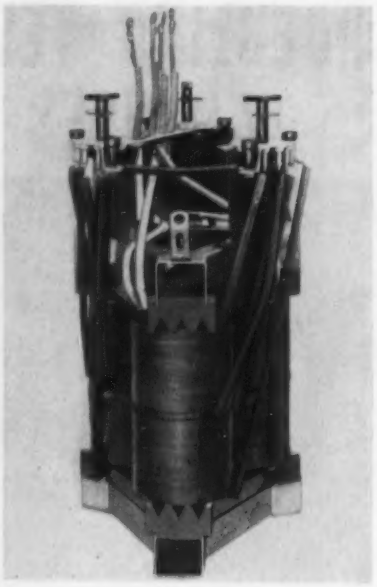


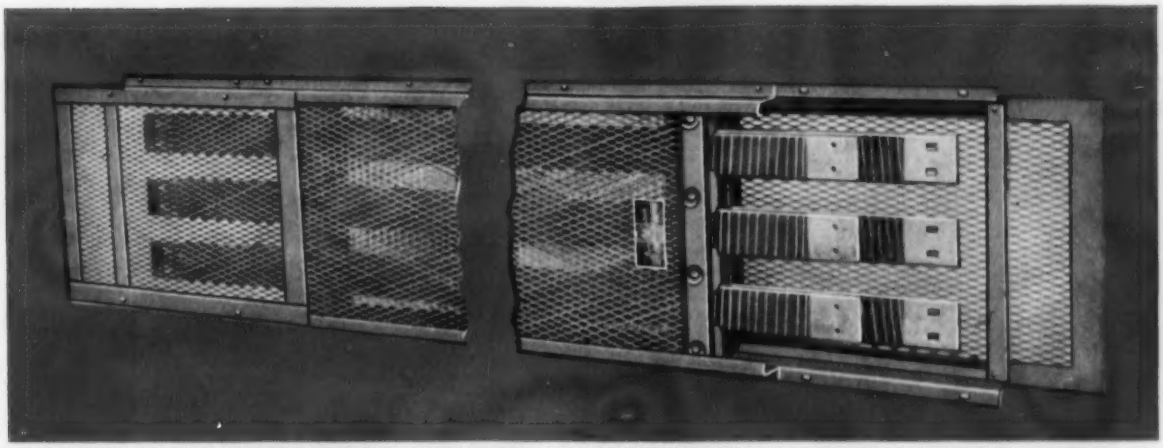
Transformer

(20) Line Material Co., Milwaukee 1, Wis.

Designated Tri-Wound, this new three-phase transformer is available in sizes 9 through 75 kva and in standard primary voltage ratings through 13,800 v in the delta-delta, delta-wye or wye-delta connections. It incorporates a wound core that is common to all three coils, offers substantial reduction in weight and height over the existing Triplex line, which it supplements. Features of the single-phase Round-Wound retained in the Tri-Wound include uniformly high impulse level, low exciting current, high short-circuit strength and excellent overload capacity, the manufacturer states.

(21) **SUPERVISORY CONTROL**—New supervisory control equipment designed for use with any type of communications equipment capable of carrying audio signals, including microwave and very high frequency radio as well as power line carrier and wire lines, has been developed by Motorola Communications and Electronics Division, 4501 W. Augusta Blvd., Chicago, Ill. The manufacturer states that, unlike conventional remote control apparatus using multiconductor cables, where installation and maintenance costs can become prohibitive as distance increases, this system is well suited to operation over long distances.

(22) **THERMOSTAT**—An electric clock-type day and night thermostat called the Tempotherm is offered by General Controls Co., Glendale, Calif. It automatically lowers and raises temperatures to give comfortable sleeping levels during the night and warm rooms in the morning. Two models for operation of 24-v, two-wire heating control systems are produced, one for modernization and another for new construction.



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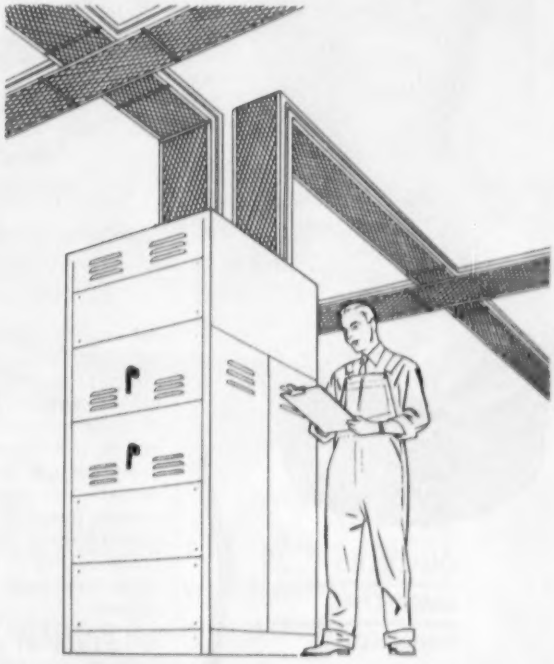
Aluminum Bus Bars

costs less to buy—
less to install



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The weight saved by using aluminum cuts handling and installation costs. This, plus lower first cost, are prime reasons for the widespread use of BullDog aluminum bus duct in plants everywhere. What's more, this weight-saving eases the strain on building superstructures and other supporting members.

Dependable BullDog Lo-X Bus Duct is both efficient and flexible—can be easily relocated to fit any plant rearrangement. Let your BullDog Field Engineer or Qualified Distributor tell you about the *many* advanced BullDog products. Or write: BullDog Electric Products Company, Detroit 32, Michigan.

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Fork Light

(23) Killark Electric Mfg. Co., Vandeventer & Easton Ave., St. Louis 13, Mo.

An aluminum fork light for outdoor use consists of adjustable nonrusting fittings including a two-tine fork, ½-in. extension, conduit nipple, plug and sealed-beam flood lamp. All units are supplied with rubber-covered wire and plugs; can be furnished with or without weatherproof switch.

Welded Pin Bases

(24) Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

A change to welded base pins from soldered or crimped pins for fluorescent lamps has been announced by this manufacturer. They will be used first in the 40-w rapid-start lamp. Welded pins effect a positive metal-to-metal contact, eliminating possibility of corrosion or contact resistance, it is stated.

Lightning Arrester

(25) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

An improved station-type lightning arrester, type SV, contains a new safety pressure relief device; is applicable to voltages from 3 to 330 kv. Addition of exhaust ports on the arrester makes possible the removal of the source of gas generation, should the arrester lose its ability to limit or interrupt power flow, according to the manufacturer. The arc is transferred to the outside of the porcelain housing within one-half cycle or less of fault current.

(26) STAND-BY PLANT—High-capacity 75,000-w emergency electric generating plant has been put on the market by D. W. Onan & Sons Inc., Minneapolis 14, Minn. This model 75HR is gasoline-engine driven; will produce either 75,000 w of 60-cycle a-c at 1,800 rpm or 60,000 w of 50-cycle a-c at 1,500 rpm. It was designed to give excellent electric motor starting, the manufacturer states. Automatic line transfer controls are available.

(27) UNDERFLOOR DISTRIBUTION SYSTEM—An underfloor distribution system called Powerduct is said to offer concealed large-capacity raceways. It comes in 10-ft lengths and is installed with junction boxes, couplings and self-leveling supports on form, slab or fill prior to pouring the finished floor. Preset inserts in the duct provide evenly spaced outlet points for standard connections to equipment. If additional outlets should be needed, "afterset" connections can be made through the floor to duct using simple tools, according to the manufacturer, Walker Bros., Underfloor Division, Conshohocken 29, Pa.

Fill in Coupon on Page 54

Capacitor

(28) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

A 5-kvar, single-phase, 240-v power capacitor for secondary distribution circuits is available in addition to the 3-kvar unit previously announced. Improved design provides for mounting with terminals either up or down. Each capacitor is supplied with a galvanized steel bracket for direct pole mounting. An adapter converts the pole bracket into a standard EEI-NEMA crossarm bracket. Terminal-mounted fuses that are coordinated with the power capacitor ratings are available. Two insulated leads, 48 in. long, are supplied with each capacitor.

Power Line Trouble Indicator

(29) R. G. Genzlinger Inc., Neshaminy, Pa.

The Silent Sentry Line Fault Indicator is a low-cost electromechanical assembly that quickly indicates a fault condition on power lines with a visible flag signal. The manufacturer reports that line disconnect and extensive testing are eliminated in locating trouble spots. The device is permanently installed at spaced locations and installation is easily accomplished with a hot line stick.

(30) TIMER—Designed for major electrical appliances, a new line of compact timers has been introduced by the R. W. Cramer Co. Inc., Centerbrook, Conn. The new timer is driven by a high-torque type 112 synchronous motor rated 30 in.-oz. at 1 rpm.

(31) INDICATOR—An indicating millivoltmeter featuring short response time and high accuracy has been announced by the Bristol Co., Waterbury 20, Conn. This model 580 is said to have an accuracy of 1% of full scale value, minimum response time of less than six seconds for 99% response. It may be used at a pyrometer, tachometer or pH indicator or for power consumption measurements. Details in bulletin P1244.

SAVE $867.54

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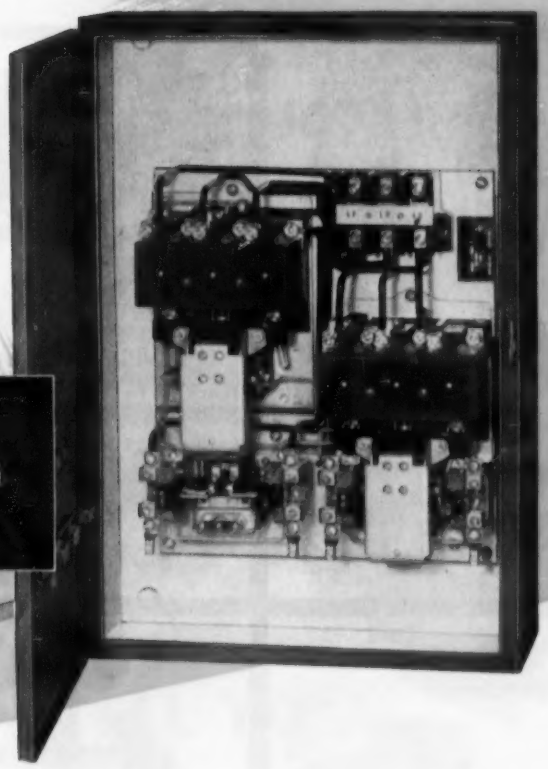

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This part winding motor starter can be used with most standard 220/440 volt, Y connected motors, when used at 220 volts.* It costs only ⅓ to ½ as much as the least expensive (primary resistor) starter, depending on horsepower. Yet, its starting torque is essentially the same and the starting current is actually lower.

** Part winding starters arranged for 440 volts are also available*

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Killark ELECTRIC MANUFACTURING COMPANY

VANDEVENTER AND EASTON
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Troffers

(32) Lighting Products Inc., Highland Park, Ill.

These troffers can be installed glass to glass to form a line of light unbroken by dividers; are adaptable to any type of ceiling. They offer a selection of shielding media, including metal and plastic louvers, Corning lenses (flat and curved), Albalite glass (flat and dished) and dished Plexiglas. All are interchangeable in the frame, which is slipped into place without tools and is secured by a floating hinge, hidden from view.

This troffer will take from one to four lamps, preheat, rapid start, slimline. It requires less than 8 in. in the ceiling and is suspended by the manufacturer's patented Flexahanger. Lengths are 24, 48, 72 and 98 in. Widths are 12 and 24 in.

(33) SAFETY MESSAGE—A self-sticking accident prevention sign for use on safety helmets has been added to the W. H. Brady Co. line. Literature and samples may be secured from the manufacturer at 727 W. Glendale Ave., Milwaukee 12, Wis.

(34) RECORDER—Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10, Ohio, has a new receiver recorder for pneumatic and electric transmission systems in power and process plants. It will record any measured variable that may be converted to pneumatic or electric signals, the manufacturer states. It is designed for panel mounting, requiring a cutout 14x17 in.; panel bolt holes and studs are not required.

(35) PLUGS AND RECEPTACLES—The one-piece interior assemblies of a new series of heavy-duty circuit-breaking plugs and receptacles for portable electrical equipment outlets can be interchanged with a screwdriver, according to the manufacturer, Crouse-Hinds Co., Wolf & Seventh North St., Syracuse, N. Y. These M54 Arktite plugs and receptacles feature pressure connector wiring and take any type and size portable cable up to a full 30 amp capacity at 600 v a-c or 250 v d-c. Wiring is accomplished quickly; the interior plug assembly lifts out in one piece while the receptacle interior assembly remains intact without either plug or receptacle contacts being removed. Two styles of grounding are employed.

Fill in Coupon on Page 54

"WILL IT PAY US TO USE ALUMINUM CONDUCTORS?"

Simplex CAN TELL YOU ...WITH AUTHORITY...

Now that the furor over the use of aluminum in wire and cable has died down, it is possible to look at this conductor metal dispassionately and see where it will best serve you.

One of the important things to remember about aluminum is that it is merely another conductor material. It has advantages and disadvantages just as copper has. These advantages and disadvantages must be weighed carefully to be sure you get the conductor material you want. That's where Simplex speaks with authority. Our experience with aluminum covers a period of more than 30 years.

Regardless of the conductor material, there is another phase of cable construction you shouldn't overlook. That is the insulation. It is here that Simplex's 70 years of experience can save you money by suggesting the best materials and design for your job.

Why don't you write today, outlining your problem, and let us make suggestions?

Simplex WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

Pioneers in Research on Wires and Cables Since 1889

advanced-type construction for easy portability, extra versatility, assured uniformity!

Here's the kind of real portability you've been looking for in a bender for ½" to 2" pipe and conduit. Using light, but strong, aluminum alloy for many parts, the new GREENLEE No. 880 Hydraulic Bender is unusually *lightweight*, yet extra rugged, fast, powerful . . . produces 15 tons of ram force! One man can easily carry and operate it to quickly make uniform bends. Complete 90° bends can be made with one ram stroke. Separate two-speed hydraulic hand pump and bending ram simplify handling and setup. Easily operated by hand or may be teamed with a GREENLEE Power Pump for fast production jobs.

Attachments also available for bending thin-wall conduit, tubing, bus-bars. Get complete details on how to speed jobs and get better results with the new GREENLEE No. 880 Bender. Write for Bulletin E-217.

GREENLEE

GREENLEE TOOL CO.
1763 Columbia Ave., Rockford, Illinois

BULLETINS ETC.

(36) TRANSMISSION HARDWARE — Fourteen supplementary pages for its Hi-Line Hardware catalog are available from the Brewer-Titchener Corp., Cortland, N. Y. Blue prints and complete specifications on revisions and additions to the firm's line of steel and aluminum hardware are contained in the supplemental pages. A complete, revised copy of the entire catalog is also available upon request.

(37) CONNECTOR INFORMATION—Burndy Engineering Co. Inc., Norwalk, Conn., has published the latest information on its entire Crimpit connector line for overhead distribution applications. Bulletin CR-1 includes information on the newly developed Hytool MD-3 and Hypresses Y33RK and Y35.

(38) SAFETY—The 1955 issue of Everything in Safety, a catalog of personal protective equipment and industrial safety devices, has just been released by the General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa.

(39) LIFT TRUCK OPERATION—How to Operate a Lift Truck is a booklet available from the Hyster Co., Portland 8, Ore. A two-color cartoon technique is used to deal with operation, preventive maintenance, safety and basic materials handling. Write for Form 1214. Another publication available from this company is Field Report No. 56, which shows how an electric utility company uses Hyster units. Use same address, P. O. Box 4318.

(40) DICTIONARY—New "atomic age" engineering terms are defined in laymen's language in a pocket-size dictionary offered by Minneapolis-Honeywell Regulator Co., Wayne & Windrim Ave., Philadelphia, Pa.

(41) TELEMETERING — Selective Telemetering Applications, a technical bulletin available from Motorola Communications & Electronics Inc., Technical Information Center, 4501 W. Augusta Blvd., Chicago 51, Ill., provides a satisfactory answer to the cost problem in acquiring data during remote operation of various installations. Order bulletin ATIC-929.

(42) OFFICE LIGHTING—A factual treatise covering the mechanics and economics of good office lighting is offered by Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y. The publication covers such topics as layout and planning, maintenance, room finishes and color and various other phases of office lighting. Ask for Good Lighting Is Good Business.

(43) TENSOR ANALYSIS—Solving network problems by tensor analysis is discussed in a new 16-page bulletin, Tensors and Transformer Connections, released by Allis-Chalmers Mfg. Co., 930 S. 70th St., Milwaukee, Wis. The bulletin is numbered 01R8169.

(44) USE OF ALUMINUM BUS BARS — A 12-page publication offered by Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, Calif., details the availability, properties, advantages and methods of joining and bending aluminum electrical bus conductors.

(45) DISTRIBUTION CAPACITORS—A new 12-page bulletin, PFC-104, describing Tempall capacitors in steel and stainless steel cases for primary and secondary power distribution circuits and industrial circuit applications is available from Tobe Deutschmann Corp., Norwood, Mass.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

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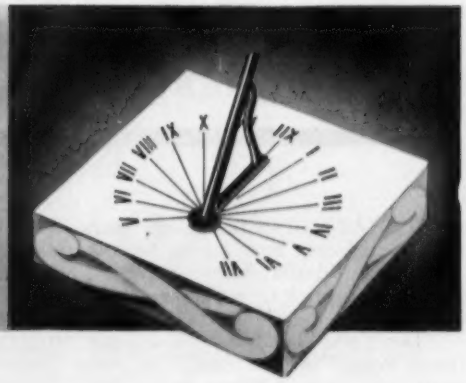
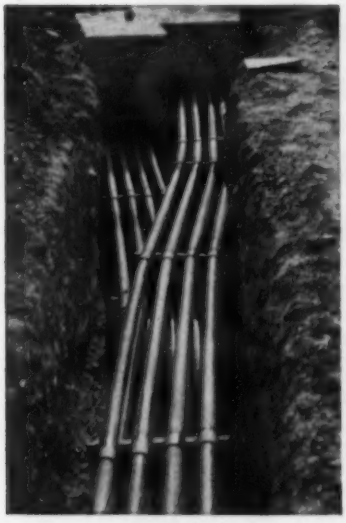


Of course the most convincing proof of Orangeburg's enduring quality is its 62-year record of service to leading Public Utilities, Municipalities and Contractors.

Quality stands out in every feature. Orangeburg Fibre Conduit is lightweight yet strong, tough and resilient. Its impermeable walls and tight joints keep out corrosive ground waters. Its smooth bore and low coefficient of friction protect cable sheaths from abrasion. Orangeburg material resists acids, alkalies, salt, grease and oil.



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For these and other advantages Orangeburg provides complete security for electrical services underground. Result...no interruption of power. These vital services keep flowing.

SAVES MONEY, TOO!

Saves by prolonging cable life . . . by faster and easier handling, tooling and laying . . . and by the use of Orangeburg's standard fittings. They cut costs by simplifying installation.

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ORANGEBURG NOCRETE is installed without concrete encasement. Extra heavy wall for direct burial—practical for many single or double duct runs.

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GENERAL ELECTRIC SUPPLY COMPANY

A DIVISION OF GENERAL ELECTRIC DISTRIBUTING CORPORATION

ELECTRA'S HUSBAND

MR. ANONYMOUS HAS HIS WEEK

"WHAT'S all the hullabaloo about engineers that I hear on the radio and read in the papers?" Electra asked one evening recently when I was helping with the dinner dishes.

"Don't you know that this is Engineers Week?" I countered. "Its purpose is to win recognition by the public generally for engineers and engineering."

"Engineers don't need recognition—they get plenty of it," she declared.

"That's what you think," I said. "Fact is that there is nothing so frustrating as the anonymity of the engineer. I know one engineer whose wife calls him Mr. Anonymous."

"Oh, that's a gag of some sort," Electra said.

"His wife has a story to prove it," I elaborated. "She told it to me at the last AIEE convention. I'll see if I can't recount just as she passed it along to me."

So here is the story of Mr. Anonymous:

The Buckleys have a summer cabin on the north shore of the lake at Pinecrest in a setting gorgeously endowed by nature—mountain lilac, giant yellow pines, old and twisted cedars and huge granite rocks. Theirs was the third of twelve cabins owned by a group of devotees of nature—a mail carrier, a priest, a couple of school teachers and the like. Things naturally were primitive. Kerosene lamps provided light. The fuel was wood. Water had to be carried from the lake to the cabins—in a big bottle for drinking and in buckets for other household purposes.

The onerous water problem was a challenge for an engineer. A couple of weeks of packing during each of the first four vacations and Jim Buckley decided that there must be some source from which a gravity water supply could be developed. A little exploration uncovered a fine spring on the other side of the ridge from the lake and about a mile and a half from the cabins. A simple engineering survey revealed that the elevation was such that the water could be piped to the lake.

All that was required to get the project in was the cooperation of the other cabin owners. One of the school teachers agreed to check the flow of the spring in late fall to see if the supply was continuous. The elderly mail carrier—the first settler—was agreeable. When Jim headed for home that summer, his head was full of the engineering details and the bill of materials that it would take to get the job done.

Jim made a quick trip to the lake that fall. The mail carrier gave him the bad news. His brother was a plumber. He had visited the lake that summer. A quick trip to the spring and an inspection of the route of the pipeline convinced him that the project was impossible.

"Does he know anything about engineering?" Jim asked.

"Certainly," the mail carrier replied. "He makes his living installing pipes. He says this thing is completely impractical. The pipe will become vapor locked."

When the Buckleys returned to Pinecrest the next summer, the first sight to greet them was a tower and tank on the site of Cabin No. 6. A gasoline engine and pump had been installed to furnish water for a group of four cabins. The gravity project was dead. Without the support of all twelve owners, it was uneconomical. So the Buckleys put in a tower, tank, engine and pump to supply the cabins in their group.

All was well for a few years. Then complaints started to develop. One cabin owner used too much water. Another balked at running the pump. Finally the mail carrier took the leadership in arguing for the gravity system. Jim agreed to engineer the job if all owners would participate.

So the project got under way. Then everybody wanted to help. One cabin owner got a bid for labor, although the sons of two of them had already agreed to do the hard work. Another insisted on cross checking all material prices with bids from his friends. Another was sure that the system would not work unless three-inch pipe was installed. Somebody else refused to let the work proceed unless there was insurance protection in case of injury to the youthful workmen. The job was almost shut down when one excited owner got the notion that it should be a multiple-purpose installation with electricity as a by-product. Time-consuming explanation by Jim finally convinced him that the engineering features for a hydroelectric development were missing—the water supply was inadequate and the friction losses in the pipe used up most of the head.

Finally the great day arrived when the water was turned into the system. A quick check showed that the supply was 8,000 gal per day, just as Jim had estimated. So a banquet was in order to celebrate the event. Jim readied a little speech of appreciation for the thanks he knew would be coming.

"Ladies and gentlemen, this is the day I have been looking for and longing for ever since I found that spring," the president of the association said when the eating was about finished. "It has been a lot of hard work and has cost considerable money, but the value of our cabins has been increased a thousand dollars each. With the help and assistance we each gave our young workers and with our careful supervision, the job finally was finished. I now want to call on the individual most responsible for the project (Jim started to rise) I refer to our secretary from Lot No. 11."

The secretary arose and in a few well chosen words told how he had saved the cabin owners much money by getting bids on materials and by carefully checking prices. Then the president closed the affair.

But the anonymity of the engineer didn't end there. The water system worked perfectly for several years under Jim's occasional supervision. Then one day the wife from Cabin 11 brought over a guest to the Buckleys.

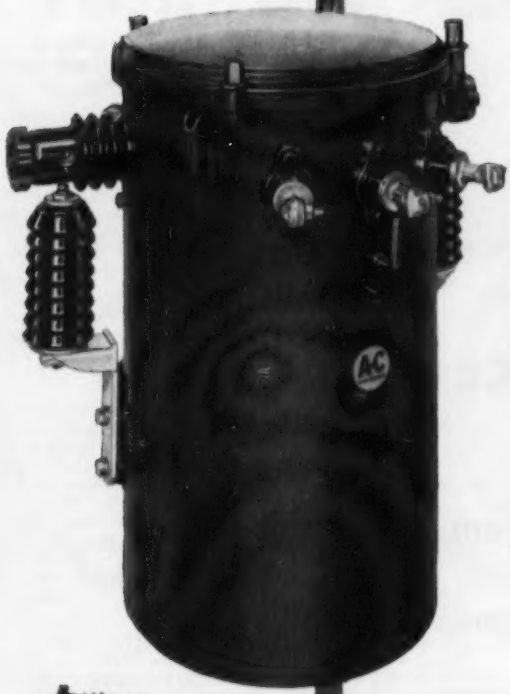
"I want you to meet Mr. X, the man who is really responsible for our Pinecrest water system," she said.

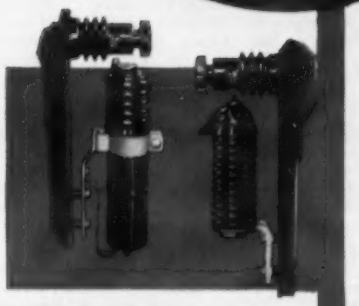
"But I thought Jim found the spring and engineered the project," Mrs. Buckley protested. "I don't remember his ever having consulted Mr. X."

"Maybe not," said the wife from Cabin 11, "but I asked Mr. X and he is the one who told me that the system would really work."

Insofar as the water system is concerned Jim is still Mr. Anonymous.

ACP Transformers





Allis-Chalmers lets you choose your lightning arrester

Either valve-type or expulsion lightning arresters are available on ACP transformers. You may select the exact arrester you prefer. An air gap between arrester and bushing assures that arrester is never energized except during lightning discharge. The result is reduced possibility of radio interference and longer arrester life.

- **Simpler Installation**
- **Less Maintenance Cost**
- **More Transformer Capacity**

HERE ARE SOME OF THE WAYS your system benefits when you use Allis-Chalmers *Protected* transformers: Maintenance costs decrease because many fuse-replacing trips are eliminated — circuit breakers now do the job. And you get more capacity from each transformer because premium protection lets you work closer to the maximum capacity. A convenient signal gives plenty of warning when overload conditions exist.

Complete Package

Best of all, this premium protection comes in a single, easy-to-handle package. Lightning arresters, gaps, low voltage circuit breakers, and protective links are built in. Installation is simpler than with a conventional distribution transformer. There are no extra accessories, nothing else to buy.

There are advantages in extended transformer life, too. Find out all about how ACP transformers pay off in better system operation, lower overall costs. Consult your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 61B7309B. A-4545

ACP is an Allis-Chalmers trademark.

ALLIS-CHALMERS

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3-WIRE CONVENIENCE OUTLET

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where price is an important consideration

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A competitive, yet highly dependable, duplex flush-mounting receptacle for all practical applications — another example of Hubbell's ability to provide the best in design, materials, and performance even when price is an important consideration. Side-wired with grounding terminal and parallel slots, in brown bakelite and ivorine. Write for full details on its rugged dependability, or see your Hubbell distributor.

FEATURES

- Large-head binding screws for conventional wiring
- Break-off feature for two-circuit installations
- Hexagonal green screw for grounding wire
- Will accommodate two armored or rubber caps
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ELECTRICAL BOOKS

THE FOUR WHEEL DRIVE STORY, *by Howard William Troyer, 215 pages, 6x9, McGraw-Hill Book Co. Inc., $4.*

The design and development of the first practical four-wheel drive by Otto Zachow was the beginning of "A Chapter in Cooperative Enterprise," as the subtitle describes it. This is an interesting and entertaining history of a small business that became big. It is about a real example of the often misappropriated and misconstrued phrase, "the American way of life."

ELECTRICITY — DIRECT AND ALTERNATING CURRENT, *by Charles S. Siskind, 538 pages, 6x9, McGraw-Hill Book Co. Inc., $5.75.*

This book discusses the general elementary principles of d-c and a-c electricity. It illustrates how these principles apply to the construction and operating characteristics of the more common circuits, devices and machines. A series of simple experiments with easily obtainable and readily constructed apparatus is presented. From these the student can demonstrate and verify the principles to his own satisfaction and test the practical applications to the topics explained in the text.

ASTM STANDARDS ON METALLIC ELECTRICAL CONDUCTORS, *sponsored by ASTM Committee B-1 on wires for electrical conductors, 280 pages, 6x9, paper cover, American Society for Testing Material, $3.25.*

The October 1954 edition of this compilation includes in latest form 49 ASTM standards including 41 specifications, 7 test methods and one classification of coppers. From the earlier edition 21 of the specifications have been revised and three of the standards are new.

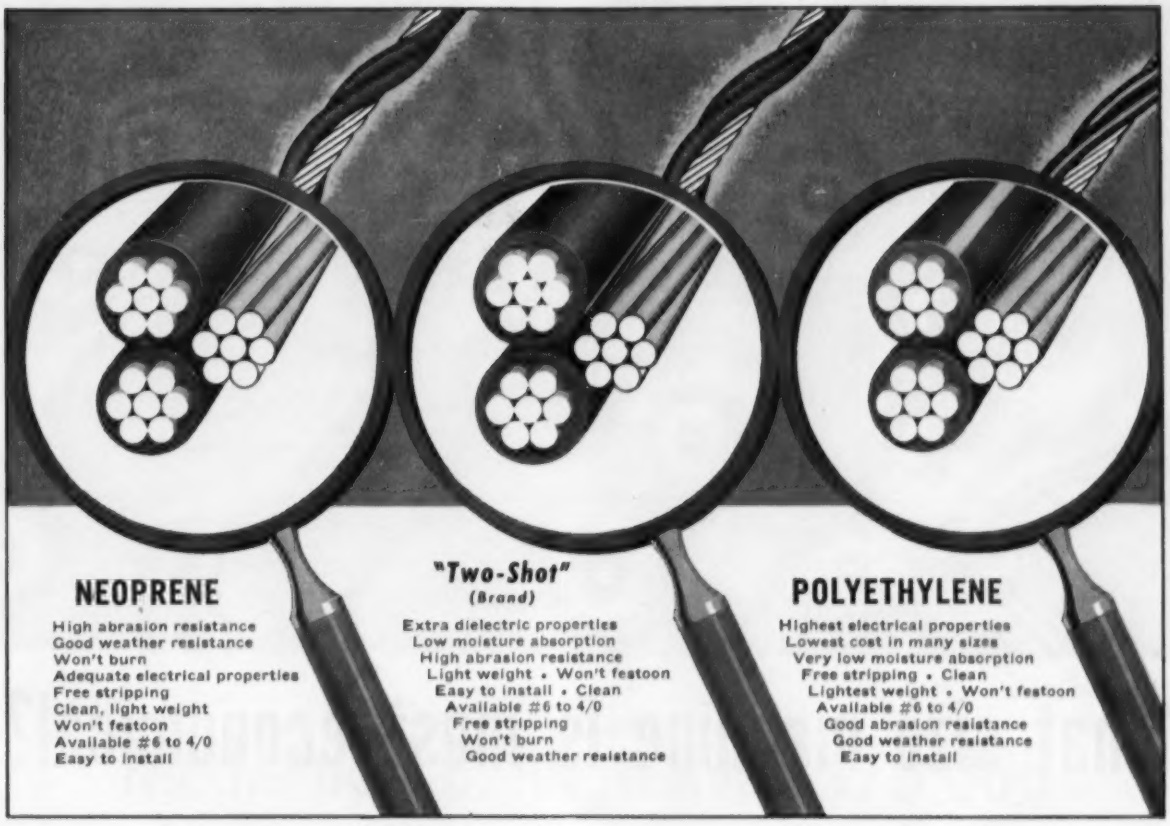
FORMULAS FOR COMPUTING CAPACITANCE AND INDUCTANCE, *by Chester Snow, 69 pages, 8x10½, paper bound, National Bureau of Standards, U. S. Department of Commerce, 40c.*

This collection contains some formulas commonly used in electrical work and some specially developed for precision work at the bureau. One section is devoted to discussion of the relation between Legendre and elliptic functions.

ELECTROACOUSTICS, *by F. V. Hunt, 260 pages, 6x9, Harvard University Press and John Wiley & Sons Inc., $6.*

No. 5 of the Harvard Monographs in Applied Science, it presents a unified basis for analysis of electroacoustical transducers. Subject is introduced with an account of the historical origins of these devices in the basic sciences and their allied arts. Topics included deal with origins of echo ranging, crystal oscillator, electrostatic transducers and the evolution of the dynamic loudspeaker. Introduction of a space operator makes possible a discussion of all types of electromechanical coupling, including magnetic, electric and mixed transduction fields.

Choose your service drops from the K/W TRIPLEX TRIO



YOUR CHOICE of service drop insulation is readily available in Kaiser Aluminum's K/W Triplex Trio.

Whether you prefer Neoprene or "Two-Shot" or Polyethylene, you can specify K/W with full confidence of getting the highest quality materials to meet your needs.

For example, if you want a premium-type product, you can order K/W's long-accepted "Two-Shot" Triplex at slight additional cost. The phase wire insulation—a 2/64" inner layer of special rubber (3/64" on stranded wire) with 2/64" jacket of tough Neoprene. "Two-Shot" Triplex provides added dielectric properties and weather resistance.

Otherwise you can specify regular K/W Neoprene or Polyethylene insulated Triplex or covered line wire for open wire services. No matter which conductor you choose, you are assured of long trouble-free service when you use Kaiser Wire.

If your services go through trees, ask your Kaiser Aluminum conductor engineer for advice on suppliers of economical tree guards, or you may want to consider a new Kaiser Aluminum development—"Double D Armored SD."

For complete information on Kaiser Aluminum conductors, contact our sales office listed in your telephone directory or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.; *Executive Office*, Kaiser Bldg., Oakland 12, Calif.

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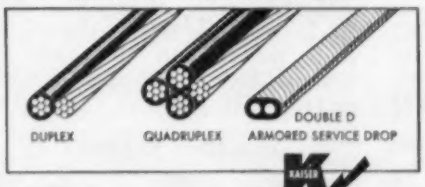

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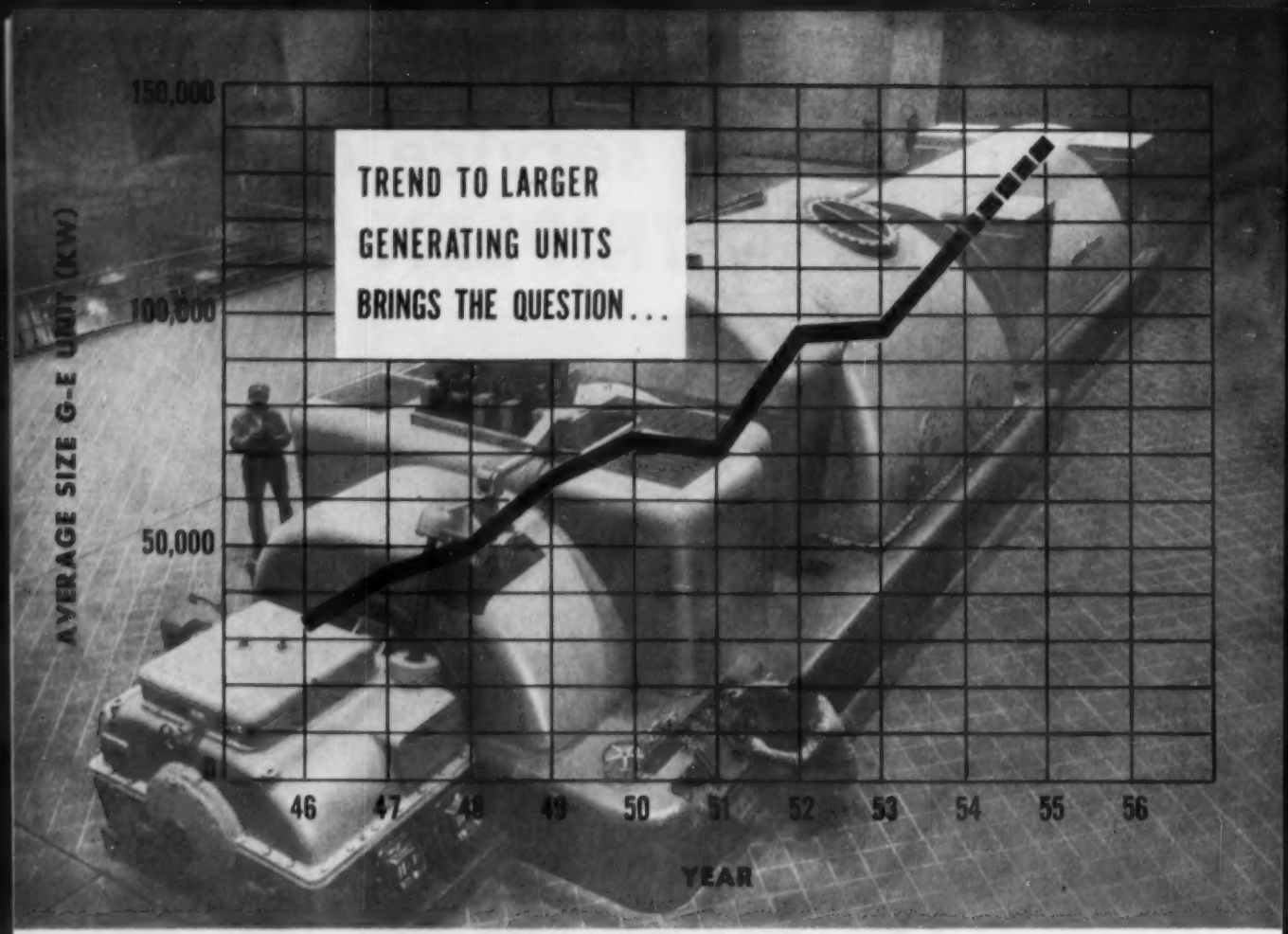


What size machine is most economical?

TREND TO LARGER UNITS, discussed here by A. G. Mellor (right) and Dr. L. K. Kirchmayer, G-E electric utility engineers, is revealed in estimates that average 1955 G-E units will be four times the average size of 1946 units.

Spurred by load growth trends, many electric utilities are now evaluating investment costs, reserve requirements, labor costs, transmission losses, interconnection facilities, and heat rates to determine the best size of generating equipment to meet system expansion.

Application of methods developed in recent General Electric studies to individual systems should help utilities reach the most suitable answer. In general, large generating units are the economical choice.

LARGER UNITS FAVORED

As load growth dictates additional generation, operating economies generally favor the larger units, based on generation costs and manpower requirements. Sometimes investment charges are higher when large units are used, because of increased reserve requirements. However, these fixed costs are often offset by reduced fuel requirements for the portion of the load that the newer unit takes over from older, less efficient machines.

A typical analysis points to units of 7% to 10% of system size as the economic way to add capacity.

500,000-KW UNITS

With G.E. constantly making technological developments, units of 350,000 kw are under engineering consideration and units of 500,000 kw are possible in the future.

If load growth follows today's patterns, large generating equipment may prove extremely rewarding. For more complete information on determining the optimum size of generating units, contact your G-E Apparatus Sales Representative, or write for bulletin GER-1030 to General Electric Company, Schenectady 5, N. Y. 301-184

MORE POWER TO AMERICA

GENERAL ELECTRIC

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. VOL. 114 No. 3 MARCH 1955

This 604 IBM electronic calculator is key machine in mechanized billing and accounting department of the Salt River Power District

Mechanical Billing Saves $75,000

Monty M. Peeler
Manager Power Service Division
Salt River Power District
Phoenix, Ariz.

To expedite service to the customer and to reduce the cost of billing, the Salt River Power District, with headquarters in Phoenix, Ariz., has completed the last phase of its new mechanical billing system. With the addition of a No. 604 IBM electronic machine early in 1953, plans were made by Cecil Huff, supervisor of the billing department, to start changing over to the new system.

All machine components of the system are now in operation with the result that the customer receives his bill three days after the meter is read and the district is realizing an estimated saving of $75,000 a year in billing cost. Further savings are expected as time goes on, through smoother functioning of the new system and additional uses to which the electronic-mechanical equipment will be applied. As it is, despite the addition of 7,500 new meters in 1954, that would have required more help, the new system made it possible to reduce personnel by two. As for the recovery of the cost of the new system, this cannot be computed at this time because the system is being used for too many various items.

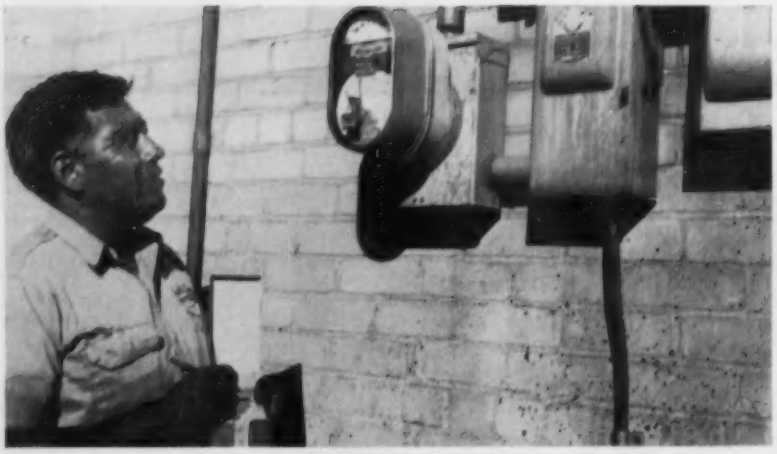
Conversion Procedure

Before the conversion to mechanical billing was undertaken many instructive and indoctrinational meetings were held between supervisors and employees. Big headache, if it can be called that, was the transition from manual work, where perhaps a thousand pieces were handled, to the IBM method where only a few IBM cards were utilized.

The first step taken to mechanize billing was the installation of the master service record file. This contains a history card for each meter and account. Each card carries the name, address, location, account number, meter number, constant, rate, type of service, etc. This section is the key to the entire system.

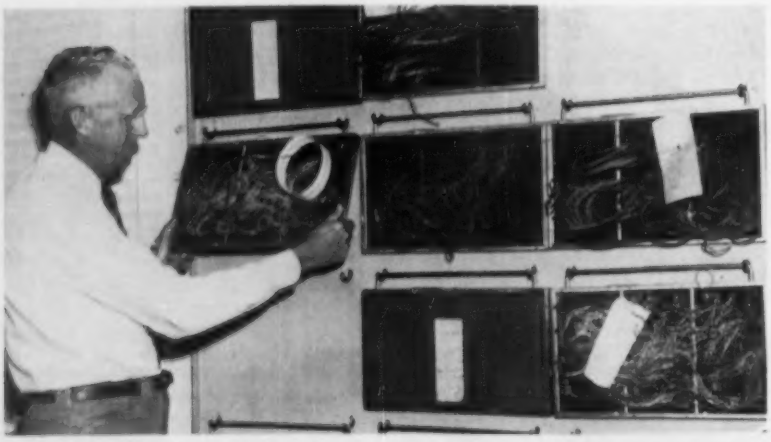
The second step, the accounts receivable section, was placed in operation in February 1954 when the accounts receivable card files were set up. The cash is posted by machine daily. All cash and stubs from branch offices and pay stations are received in this section by 4 p.m. each day, are balanced and sent to IBM to be posted. The accounts receivable card is matched with the stub and removed from the receivable file by machine so the file is current by 8 a.m. the following day.

The third step was mark sense meter reading and billing. An IBM card was



Mark sense meter reading. Graphite pencil is used to mark reading on IBM meter cards

Placing new plug board in reproducing machine that reproduces new cards from old ones



Intricately wired plug boards tell the machines all the functions they are to perform

made up for each meter, preprinted with numbers for 10 months' reading. The meter reader uses a high-grade graphite pencil to mark the numbers on the card to correspond to the reading on the meter. The cards are then run through a machine where the graphite mark sets up an impulse and puts into motion an operation that reproduces the reading on a billing card, subtracts the previous month's reading and prints the difference, which is the kilowatt-hours used, and checks this figure with the previous month's use for high or low consumption. This eliminates the element of human error and results in a machine preaudit. From the billing card, a statement card is produced, which is mailed to the customer, and the billing card becomes the accounts receivable card and goes into file.

The fourth and final step, completed in September 1954, is the service order. This includes new meter sets, turn ons, turn offs, final bills and miscellaneous adjustments that have just been put on the machine, which are processed daily.

Under the new system manual work in the billing section has been reduced considerably. Studies are continuing to consider the application of the method to large power customers. With an increase of approximately 7,500 meters last year, personnel has been reduced to less than used by manual billing in the year 1953, as mentioned previously. This mechanized method handles 6,000 bills and accounts receivable cards per hour, statement cards to the customer are processed at approximately 1,000 cards per hour and the bill is mailed to the customer usually three days after reading.

Besides billing some 48,000 meters per month, the IBM department is used for the Irrigation Division for 160,000 operations and about 50,000 billing statements per year; warehouse accounting, consisting of 10,000 items with 30,000 issues per month; and the processing of the pay roll, with nearly 1,400 employees affected.

This new system is expected to effect an estimated saving of $75,000 per year, as stated. Machines for the large IBM department are rented at an average cost exceeding $6,500 per month. This IBM department, under the supervision of Dave Voorhis, is one of the largest in the Southwest. Equipment consists of eight key punches, four verifiers, five collators, five sorters, five accounting machines with two bill feeds, five reproducers, two interpretors, and one calculator. Thirty employees help to process 15,000,000 cards annually. About 8,000,000 cards are purchased in a year. Of these the women employees key-punch 2,400,000 cards annually.

First 100,000-kw unit is in operation at San Diego Gas & Electric Co.'s Encina plant

Cooling Water Was Problem

Walter A. Zitlau

San Diego Gas & Electric Co.

Completion of Encina unit No. 1, representing present investment of $19,000,000, was a major step in power production facilities for the San Diego Gas & Electric Co. First of four 100,000-kw units went into operation last fall. Addition of the unit increased the company's generating capacity by 30% to a total of 400,000 kw.

When completed the plant will have four units and total cost will exceed $60,000,000. The first unit is designed for base load operation and is expected to have an economy of 10,500 Btu/kwh at full load.

Cooling water, discussed later, offered one of the biggest problems in the design of Encina, located on the coast at Carlsbad, 34 miles north of San Diego. The site was chosen after consideration of possible sites along the San Diego County coast.

Since native fresh water supplies are scarce in San Diego County, the use of salt water for cooling was the alternative. City and state ownership of much of the land bordering San Diego Bay made otherwise favorable sites undesirable because of the difficulty of financing construction on leased land. This is illustrative of the problem utilities face in finding suitable locations for modern steam stations.

The site at Carlsbad offered good foundations close to the ocean, with natural gas supply, rail, highway and housing facilities close by. Short transmission lines permitted connection to the important transmission substation at San Luis Rey that serves the northern and eastern service areas.

Contrary to some recent West Coast practice, the station is fully enclosed except for circulating water pumps and fresh water cooling heat exchangers. These are located over the circulating water tunnels adjacent to the station.

Heavy mat foundations on sandstone support the building structure, which is designed to withstand lateral seismic forces of 0.2 G applied to dead loads, equipment loads and piping loads but not to live loads. The steel building frame was designed as a rigid frame braced by diagonals.

The General Electric turbine is a 3,600-rpm, single-shaft, tandem-compound, double-flow reheat type, operating at 1,450 psig and 1,000 F with reheat to 1,000 F and exhaust to 1½ in. Hg abs. Five extraction points are used for regenerative feedwater heating. The generator, rated 100,000 kw at 0.85 pf, is hydrogen cooled using hydrogen pressures from ½ in. Hg to 30-lb gage and generates at 14,400 v. The exciter is provided with amplidyne control.

The B&W radiant reheat boiler has a rating of 700,000 lb/hr continuous with 1,725 psig outlet pressure, 1,000 F final steam temperature and 1,000 F reheat temperature. Primary and secondary superheaters are separated by B&W spray-type attemperators.

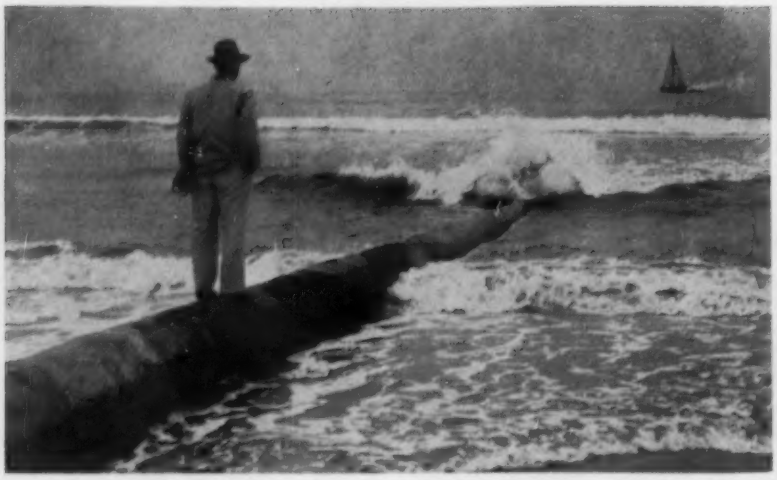
Cooling Water Problem

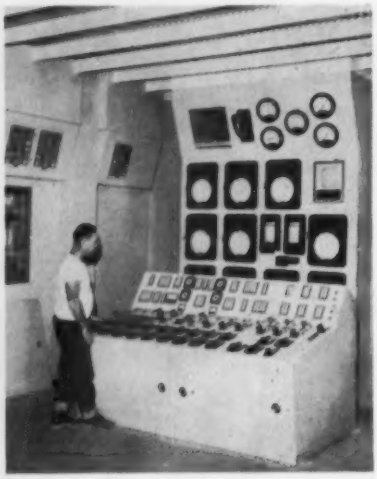
Probably the most interesting problem in connection with the project was that of getting cooling water in and out of the station. Eight plans were studied. Consideration was given to tunnels of various kinds extending out into the ocean. The coast is subject to heavy storms and coastwise movement of sand. Twin tunnels and provision for unwatering and inspection was at least desirable.

No plan was found that met these requirements at reasonable cost so all tunnel plans were abandoned in favor of a plan that contemplated taking water from Agua Hedionda Lagoon, adjacent to the plant, and returning the warmed cooling water directly to the ocean some distance from the lagoon mouth. The mouth of the lagoon was normally closed by a barrier of sand built up by the ocean and was open only for relatively short periods when winters of heavy rainfall produced a good runoff and flow to the ocean.

The plan adopted required development of sufficient tidal prism in the lagoon to keep the lagoon mouth swept out and open under all conditions. A lagoon area of approximately 240 acres was dredged to a depth of 8 ft below mean sea level. Some channels were dredged to a depth of 20 ft to serve the two reinforced concrete tunnels that extend from the lagoon to the station.

More than 4,000,000 cu yd of material were removed from the lagoon and deposited on the adjoining beaches. To accommodate the flow of sea water into the lagoon, one highway bridge over the lagoon was remodeled, channels under two other bridges were enlarged and two 350-ft-long jetties





Oil supply is through marine pipe line (left) from off-shore tanker. Right: Central control room has closed-circuit television

were constructed to improve the lagoon entrance.

The Worthington condenser is of the two-pass, divided water box design with a total surface of 60,000 sq ft. Two circulating water pumps deliver the required 48,000 gpm of circulating water. These cooling water pumps are 36-in. Hi-Flo vertical units with submerged suction. Their motors, being out of doors are totally enclosed fan cooled—200 hp, 2,300 v, made by Allis-Chalmers. Worthington also supplied the two condensate pumps. These are driven by Westinghouse motors through variable speed hydraulic couplings. Coupling control is a function of hot well level.

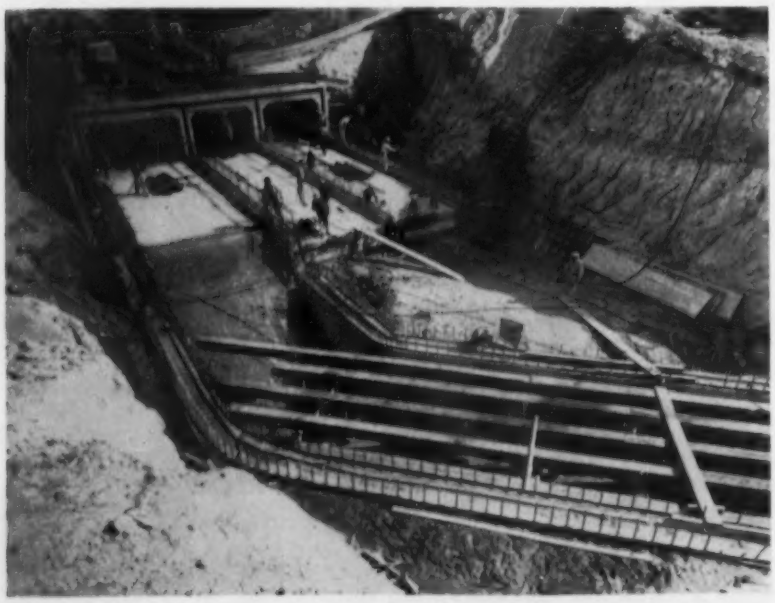
The steam generator, already mentioned, is equipped with the following auxiliaries. There are two forced and two induced draft fans. These fans, supplied by Buffalo Forge, are driven through variable speed couplings that function as an integral part of the over-all control system. Two Ljungstrom regenerative-type air heaters are employed.

Steam temperature control is obtained through the use of gas recirculation, which involves a fifth fan, also by Buffalo Forge, and attemperators between the primary and secondary superheaters.

The boiler is equipped with 10 combination wide range gas and oil fuel burners. These burners, supplied by Peabody Engineering Corp., are equipped with remote manual positioning and register operation. Burner ignition is by means of Peabody ignitors.

Gas fuel, which is available only during the summer months, is taken from one of the utility's two gas fuel transmission lines. Pressure from the main is reduced to 80 psig for the gas metering run and station header. Maximum gas burner pressure has been set at 15 psig.

The oil fuel supply for Encina introduced a new problem. There had been no previous necessity to take fuel from tankers anchored off shore as is done by neighboring utilities. Some of the major oil companies have had wide experience with such operations.



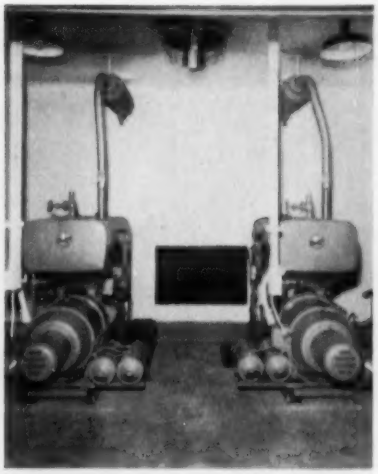
Cooling water was biggest problem in Encina design. Here are tunnels under highway

Ocean Fuel Line

The Encina installation provides means to anchor large tankers about 3,000 ft from the shore line. At this point the tanker lifts from the ocean floor a 12-in. fill hose at the end of a 20-in.-diameter submarine line. Through this line the tanker delivers oil to one of two 131,000-bbl fuel tanks. Provisions have been made for a future third tank.

Fuel oil equipment for the plant utilizes two primary and two secondary fuel oil heaters that were supplied by Braun & Co. Fuel delivery to the burner front is handled in two stages using both primary and secondary fuel oil pumps. The primary pumps are positive displacement pumps of the 5-GRS type by the Worthington Corp. The secondary pumps are six-stage centrifugal units supplied by the United Centrifugal Pump Co. Oil pressure at the discharge of the secondary pumps is 660 psig.

Before reaching the evaporator the



Microwave repeater station at Mt. Palomar (left). Right: Sheppard diesel-generators supply emergency power at repeater stations

raw water is given pretreatment by use of a hot process lime and soda softener. This softener was furnished by the Permutit Co. The evaporator furnishing make-up to the system was supplied by the Alco division of the American Locomotive Co. Capacity is 20,000 lb/hr.

The feed water system includes four closed feed water heaters and one open spray tray-type deaerator. The closed heaters were purchased from Alco and the open deaerating heater was supplied by the Elliott Co.

Three 50% feed water pumps deliver water to the boiler. These are constant-speed pumps, the control being obtained through three-element feed water control by Bailey Meter Co. The pumps are 10-stage, 840-gpm units with a discharge pressure of 1,785 psig and a suction pressure of 91.5 psig at full load. The pumps were furnished by Pacific Pump Co.

Fresh Cooling Water

Cooling water for lub oil coolers, air compressors, hydraulic couplings, fan bearings, hydrogen seal oil and other lesser auxiliaries is furnished from a closed fresh water cooling system. Two Southwestern Engineering Co. heat exchangers are used in this system. The heat exchangers are located over the cooling water tunnels and utilize salt water as the cooling medium. This system also uses two 3,000-gpm salt water pumps, two 1,500-gpm fresh water pumps and such collector and head tanks as are required for such a closed system.

There are two 50,000/66,669-kva OA/FA main power transformers directly connected to the main generator. These transformers were furnished by the General Electric Co. Connections are 13,800/138,000-v delta-wye. One station auxiliary power transformer is connected directly to the generator bus and is rated at 7,500 kva, 13,800/2,400-v delta-wye. Two other station start-up transformers rated at 5,000/6,250 kva, 138,000/2,400-v wye-delta receive energy from the bus of the adjoining 138-kv substation.

Much of the auxiliary equipment has been installed to serve two units. Most of the over-all development of the property has been completed for the four units that will make up the ultimate plant. With unit No. 2, now being installed, no further fuel oil equipment will be required. The cooling water system is equipped and sized for two units. The hot process water treating unit is adequate to serve the ultimate plant. There are a number of other features such as these that are best installed at the time of the initial installation.

The centrally located control room contains, in addition to the normal complement of instruments, three closed circuit television receivers for observing flame control and boiler water level.

Microwave Communication

Locating a large generating station of this type some distance from the system load center naturally entails problems of transmission and communication. Transmission has been mentioned but it might be well to say a word about communication.

Prior to building the Encina plant, all generation was in the city of San Diego, the system dispatcher was there, and communication needs were quite simple.

The problem of providing telephone, telemeter, teletype and supervisory control facilities for Encina led to a consideration of a microwave system. To explore possibilities of microwave a company-wide survey of communication facilities was undertaken. It developed that 50% occupancy of a 30-channel system could be developed in an initial installation.

Microwave equipment, type FR, and multiplex equipment, type FJ, using frequency division-type modulation, made by Westinghouse, was installed. The system is capable of providing 30 voice channels; it is possible to subdivide any voice channel up to 15 audio tones for relaying, telemetering, supervisory control and other remote indicating and operating functions.

The initial installation of three terminal stations and two repeater stations provides for 15 voice channels, four telemetering channels, a party-line teletype channel and two VHF channels.

Relay Stations

One of the relay stations was located at a remote and desolate spot. Economic study led to use of diesel engine driven 10-kw generators for both primary and stand-by power. The other relay station has engine-generator set for stand-by only.

An outstanding feature of the system is that it involves use of three independent automatic dial switchboards. One serves the commercial and executive's automatic dial system and serves the company's business departments. Another, the operating department dial system, serves the electric transmission and distribution departments and the gas departments. Still another, the electrical production dial system, ties the company's three generating plants together. The microwave system is a story in itself in view of the interest in the subject.

High-pressure, oil-filled pipe-type 115-kv cable is installed to feed substation supplying Sacramento's underground network system

How Subtransmission Voltage Was Chosen

Determining optimum subtransmission voltage for substations supplying underground networks is a common problem. Here is how Sacramento reasoned

C. W. Callow
Electrical Engineer
Sacramento Municipal Utility District

With rapid urban load growth in the West one of the distribution engineer's problems is determination of the optimum subtransmission voltage to substations feeding underground networks. With growth of load in the business section of Sacramento, Calif., on the newly installed underground network system, the Sacramento Municipal Utility District was confronted with such a problem, plus the additional question of the type of cable to use.

The Problem

Voltage chosen was 115 kv and cable type, two 115-kv cables of the high-pressure oil pipe type. Installation of such cables has been described many times and there is no intention here to go into construction methods. Factors influencing choice of voltage are thought to be of more interest.

Power is distributed throughout the downtown commercial area of Sacramento by an underground, 12-kv fed, 120/208-v secondary network and an older 120/208-v radial underground system. All of the 12-kv network feeders and the 4-kv feeders to the radial system are supplied from station A, located at one edge of this distribution area.

Prior to the installation of the 115-kv cables, this distribution substation received power over four 12-kv underground cable circuits from the Pacific Gas and Electric Co.'s system. Under the new plan, power was to be brought in from the utility district's north city substation located about two miles away and supplied by two 115-kv lines originating at a new receiving substation fed by 230-kv lines of the Bureau of Reclamation.

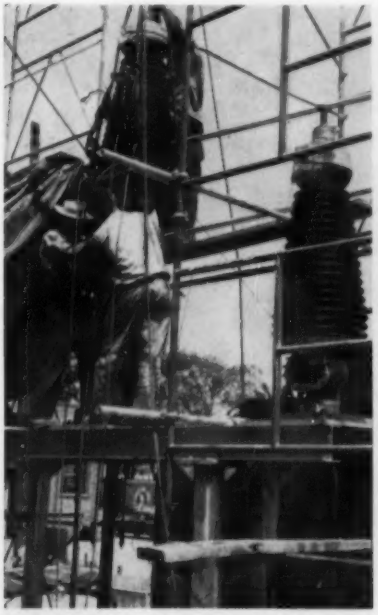
Several methods of serving the station A load including transmission at voltages of 12, 23, 69 or 115 kv were studied. Peak demand at the station was 22,000 kw, 70% of which was 4 kv. This 4-kv load is being replaced by the 12-kv system. Previous studies had indicated that the most satisfactory supply to the underground network would be in blocks of 25 mva in size. Accordingly studies were based on supplying blocks of this size with a total eventual capacity of three blocks or 75 mva.

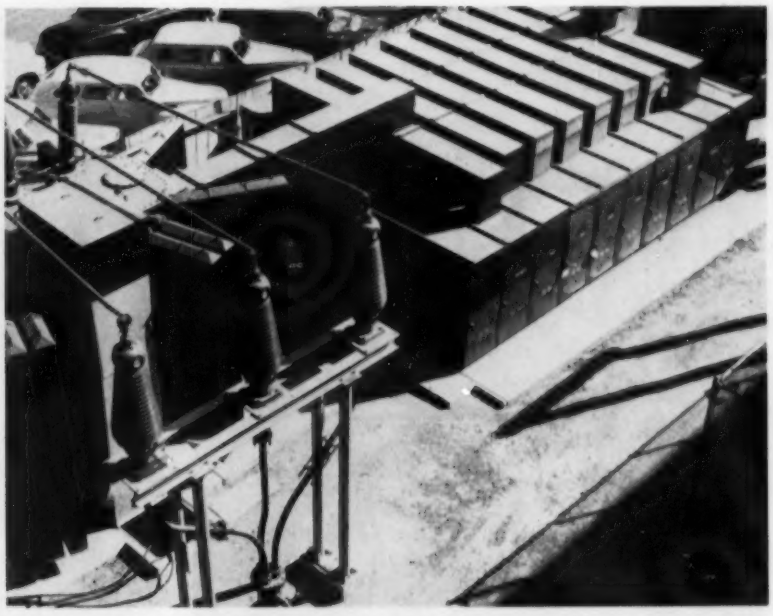
Reasons for Underground

Because of the nature of the load served, the system was designed so that service would not be interrupted by the failure of any one piece of apparatus. It was for this reason, plus the abundance of large trees and the retail-commercial and heavy residential nature of all possible routes to the distribution substation, that an underground installation was planned.

Several possible 115-kv systems using either gas or oil pressure were studied before selecting the Okonite high-pressure oil pipe-type cable that was used. General specifications of the installation are given in the accompanying box.

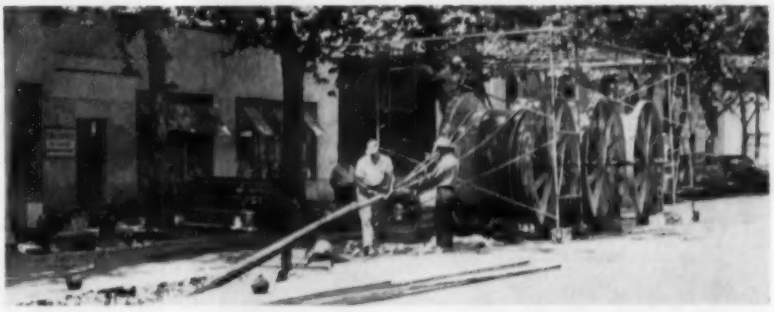
To complete the installation of this new supply to the 4-kv and 12-kv distribution systems, each of the two 115-





Pothead is threaded over end of 115-kv cable at terminus shown at right. Metal-clad 12-kv switchgear at station A is also shown

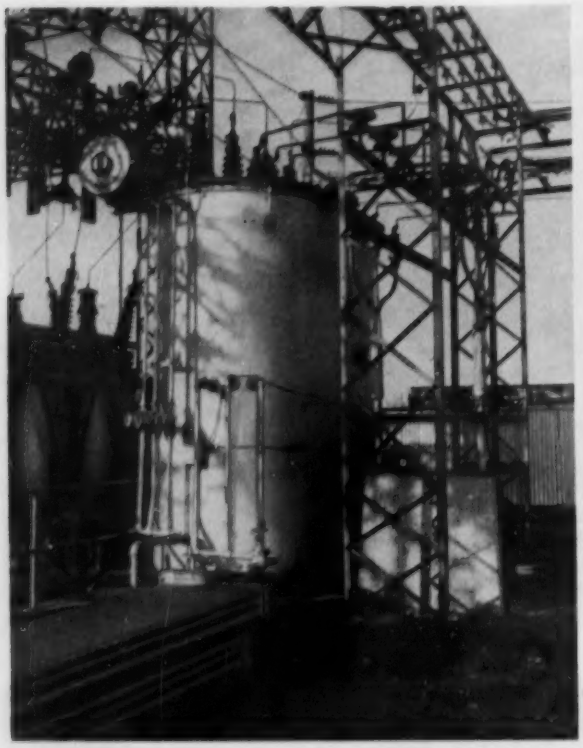
kv cable circuits was connected to a 14/18/23-mva OA/FA/FA three-phase, three-winding transformer—115/4/12 kv—at station A. The two transformers are throat connected to a 25-mva block of outdoor, 12-kv, metal-clad switchgear and connected by rubber-insulated cables in conduit to the old indoor 4-kv equipment. As loads increase, additional 25-mva blocks of 12-kv switchgear and 115-kv to 12-kv transformers will be added so that each of the two 115-kv cable circuits will eventually supply three 14/18/23-mva transformers.

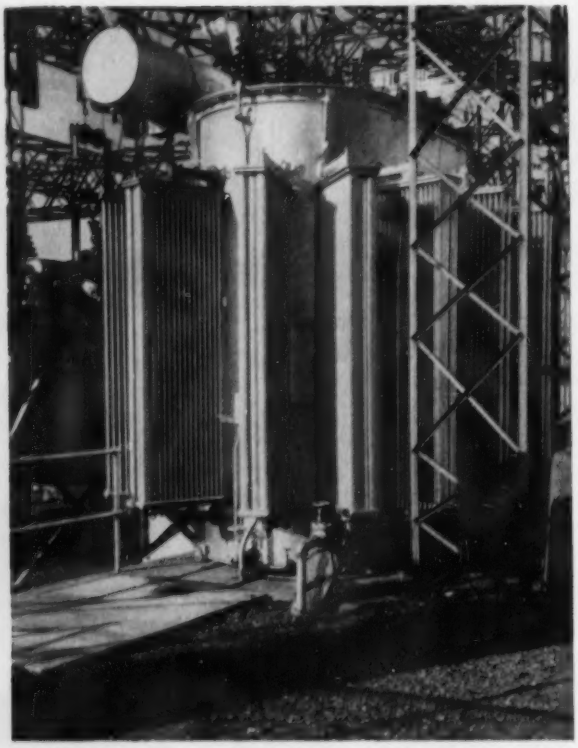


Feeding tube bolted to pipe sections eliminated cable guide reel, pulleys and rigging

General Cable Specifications

No. of circuits	2
No. of pipes per circuit	1
No. of conductors per pipe	3
Pipe specification	Electric-welded steel, 5 9/16 in. OD x .258 in. wall. Coating—outer, ½ in. somastic. Inner, No-Oxide
Conductor specification	250 MCM, single conductor, concentric copper, 435-mil paper insulation
Rated voltage	115 kv
Rated current	350 amp per conductor with both circuits in operation. 380 amp per conductor with one circuit in operation
Rated kva per circuit	70,000 kva with both circuits operating 75,000 kva with one circuit operating
Maximum copper temperature	70 C
Load factor	75 %
Ambient earth temperature	20 C
Separation between pipes	18 in. in trench, 42 in. in manholes
Average depth of pipes	5 ft 6 in.
Total circuit length	9,125 ft
Number of manholes	3
Pulling lengths	2,330 ft, 2,715 ft, 2,730 ft and 1,350 ft
Maximum pulling tension (Occurred on 2,715 ft length)	4,800 lb
Operating oil pressure	200 psi
Splices	The three joints in each circuit are of the straight-through type without stop barriers or by-pass piping
Oil pressure system	A 1,500-gal oil storage tank (750 gal each circuit) and a fully automatic dual pumping plant with gages, alarms and an annunciator. Oil is supplied to pipe circuits through the spreader heads at one end of the system





Radiators for converting from water to self-cooling were installed on the job on this 12,500-kva transformer without untanking

Radiators Installed Without Untanking

C. J. Scoville

Portland General Electric Co.*

As part of a program to automatize all attended substations, the Portland General Electric Co. recently completed the conversion of two 12,500-kva, three-phase, 57/11/4-kv transformers from water-cooled to self-cooled by the addition of tubular radiators. The first of these transformers was located in a substation in the Portland area. It was untanked and the radiator valves were installed on the tank while empty.

The second unit was located at Salem 52 miles from the nearest facility for untanking. The weight, 35 tons, prevented legal movement by highway. The height would have required a depressed center car for movement by rail. In addition, because of the location of the unit, it would have been necessary to raise it about 12 ft, by means of jacks and ties, to the level of the adjacent street.

* Superintendent, electrical maintenance and construction department.

On account of the difficulty and expense involved in moving the transformer to untank it, decision was reached to install the radiators in place, without removal of the oil or core and coils. To do this, it was necessary to bore 36 holes 4.75 in. in diameter through the .4375-in. tank wall and weld the radiator valve bodies to the tank without removing the oil. One of the accompanying photographs shows the transformer before conversion.

How Job Was Done

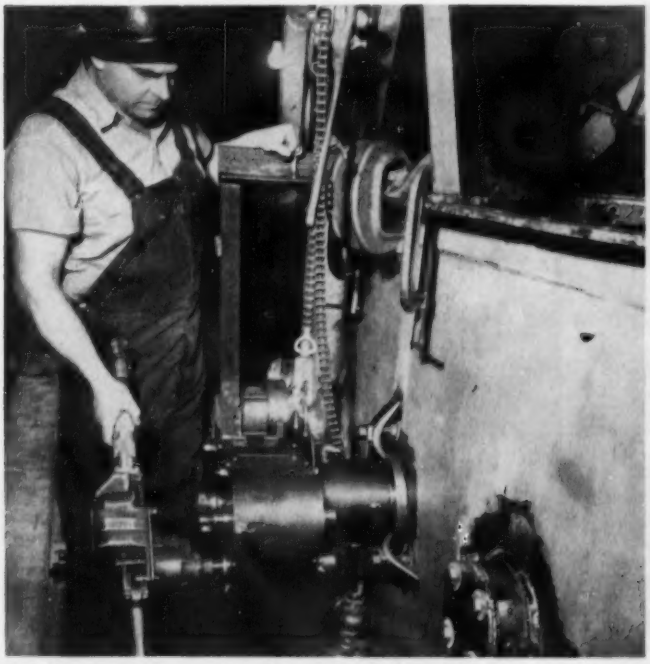
A portable boring mill was built under the supervision of Bob Harrington, shop foreman, by Stanley Wright, machinist working foreman. The cutter arbor was driven at a speed of approximately 18 rpm through a double-gear reduction by an air-powered drill. Rate of feed was .003 in. per revolution of the cutter. It took about eight minutes to cut through the .4375-in. tank wall. The power feed was accomplished with the lead screw threaded into the outer end of the cutter arbor. The cutter arbor and feed screw were both driven by a common pinion to a 79-tooth gear on the five-thread screw and an 80-tooth gear on the cutter arbor. This arrangement advanced the feed screw gear one tooth each revolution of the cutter and resulted in an exceptionally smooth and positive feed.

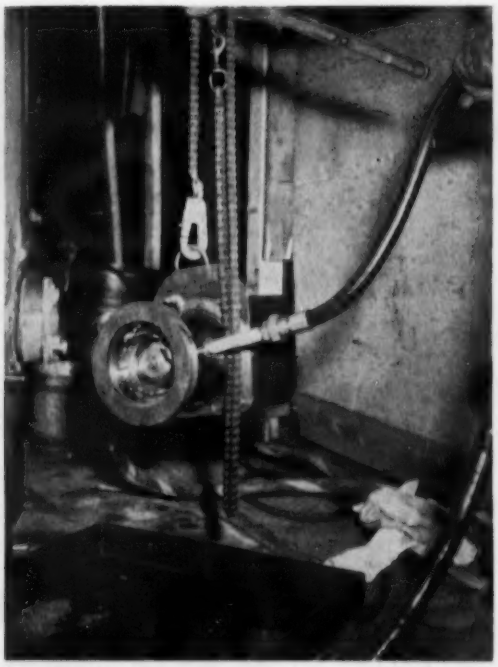
The accompanying photographs show various phases of the operation.

Shown also is the 4.75-in. OD cutter. The body of the cutter was made of shelby tubing welded to a mild steel hub. High speed tool bits are inserted by brazing into the cutting surface. The tool face is .25 in. so that the plug removed is 4.25 in. in diameter.

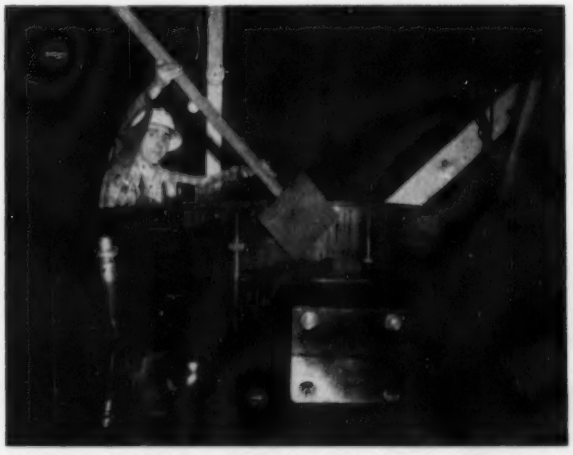
Because part of the holes were cut on a curved surface and part on a flat surface, two faceplates were necessary, one curved and one flat. These were threaded to the body of the boring mill.

Transil oil was used as cutter coolant. This was circulated from a barrel by a small pump until just before the cutter broke through to the inner tank surface. The pump was then shut down and the oil from the tank permitted to flow out through the cutter. This





Boring mill in place (left) on flat surface at top of the tank. Right: Air-driven boring mill ready to be placed in position for cut



Corprene pad (left) provides oil seal after hole has been cut through the tank. Right: Jig used to hold valves in place for welding

washed out the chips and small metal particles that otherwise might enter the transformer.

After the cut was completed a pad of .250-in.-thick corprene gasket material was placed over the hole on the inside of the tank to contain the oil while the tool was removed and the valve body welded in place. The pad was placed in position by attaching it to a wooden stock as shown and sliding it down the inside of the tank until it covered the hole. On those holes near the bottom of the tank, oil pressure was sufficient to maintain an oiltight seal. On holes near the top where the pressure was low, additional pressure was necessary. This was applied by a simple lever clamped to the top flange of the tank.

Design did not permit removal of the water cooling coils as a unit with the core in place so they were removed by cutting them in sections. Cutting was done with a hand shear in order that metal particles would not enter the tank.

Modern winding temperature relays were installed in each phase to provide fan control, alarm, and may be used to trip the breaker. Provision was made for forced air cooling and when this is provided an additional 5,000 kva of capacity will be available.

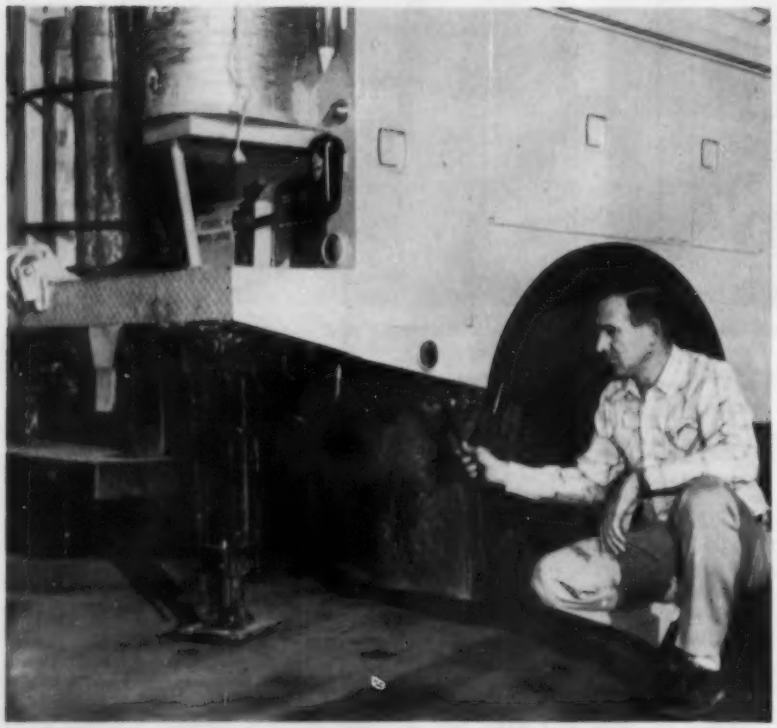
The conservator tank was enlarged to provide for the additional expansion required by the added oil in the radiators and the atmospheric breather was replaced with a divided tank nitrogen oil seal. Oil was replaced with reclaimed inhibited oil. Field work was done under the direct supervision of Al Cowles, electrical maintenance foreman.

A third unit remains to be converted in the Portland area. The Salem operation was so successful that the possibility of doing this work at the present location rather than moving the transformer for untanking is being given serious consideration.

Heavy gang truck fully equipped with power tools proves so successful that two more trucks will be similarly equipped this year

Large Savings With

Power Equipped Line Truck



Operator at the controls for derrick and hydraulic jacks that make pole setting faster

Knowing that worth-while savings could be made by equipping line trucks with power tools Arizona Public Service Co., Phoenix, has completely equipped one of its heavy gang trucks with power tools for trial use. So successful was this initial installation that the company now plans to equip two additional trucks similarly this year.

Equipment on this first truck was as follows:

A hydraulic power-operated derrick having a length of 23 ft 9 in.

Hydraulic jacks to level the truck bed, making pole setting faster and safer.

Ground plate and adjustable stiffleg for pulling poles with derrick.

A 3-kw portable gasoline engine-driven generator.

Portable floodlights mounted on stands with necessary wiring.

An electric drill large enough to use ¾-in. wood bits.

An impact wrench.

Necessary outlets for the electrical equipment.

The crew on this truck is doing work that would require a larger crew working without this type of equipment, thus effecting a large labor saving. The accompanying photographs show some of the equipment mentioned.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Truth and poetry in a sign over a draftsman's desk—"Blessed are they who go around in circles, for they shall be known as Wheels." — **Dizzy**

It is legislative season—the time when cures for economic ills are sought in laws. California's legislature has some 6,000 to simmer down; other Western states proportionately. Washington State has seven inspectors to cover the entire state and no permit fees to support inspection, so Washington State Electrical Council has had a bill introduced for permit fees . . . In Utah the Intermountain Electrical Assn. and IAEI sponsor a bill to provide state inspection. — **There ought to . . .**

California lawmakers have a flock of bills affecting the construction industry and others the appliance business. There's AB-22 to prohibit false advertising of discounts. There's AB-2190 to license appliance dealers to install, service and repair appliances and remove conflict with the Contractors License Law on installation. Another bill would limit construction that a home owner could do himself. Several bills are designed to amend the law for subcontractors listing on state work and another, AB-82, would require segregated bids for mechanical and electrical work. Another would amend the Architectural Practice Act to define how much an unlicensed designer can do. Others would give more disciplinary power to the contractors license board. — **In the hopper**

To study the various bills and report back to the construction industry is the Construction Industry Legislative Council of the California State Builders Exchange. Representing the electrical contractors is Ernest Kramm, manager of No. Calif. Chapter NECA. Associated General Contractors in general oppose bid segregation and subcontractor listing but meetings with them may bring mutually satisfactory compromises. — **Select to support**

Preliminary sparring on labor negotiations has not tipped the full hand of union demands as yet but all locals seem to be asking for more increases either openly as wage raises or hidden in such gimmicks as a seven-hour day with eight-hour pay or increased health and welfare from 7½c to 10c. Sacramento was asked for a 10% increase, about 33c an hour, plus the 10c health and welfare. Generally asked is a 25c an hour increase. Two Utah locals asked about that, were offered 5c now, another 5c in December with a contract to run to Dec. 1, 1956. The union refused and it went to the Council on Industrial Relations, whose decision has not yet been announced on this or on an Alaska case. — **Increases as usual**

Renewal of its health and welfare contract with California Physicians Service was made by the area trustees for the electrical workers trust funds. The trustees represent locals and contractors in San Francisco, San Mateo, Marin, Sonoma, Lake, Mendocino, Alameda, Contra Costa, San Joaquin, Calaveras, Kern and Inyo, Solano and Napa Counties. — **Satisfactory first year**

Fire resistivity of plastic luminous ceilings may soon be submitted to Underwriters' Laboratories by electrical manufacturers of complete systems including lighting and diffusing panels and thus satisfy the California State Fire Marshal's requirements relative use of such systems in places of public assembly such as school rooms, auditoriums and hallways, stairways. A committee of NECA headed by George Harder, San Jose chapter manager, with W. J. Varley, San Francisco manager, and Robert Schwartz, Oakland contractor, is working on the problem. — **Safety check**

Square D has added a combined meter and circuit panel in a single semi-flush weatherproof enclosure that provides main disconnect and up to 20 single or six double-pole plug-in type breakers. It maintains that an adequately wired house of today really needs that expandability. — **Certainly does**

Don Caverly, Sylvania Electric Products, New York, described "Six Key Lighting Jobs" of significance in lighting history to IES meetings in San Francisco and Los Angeles. Roy Bevan took the same story to the San Diego chapter. — **Tour topic**

New ESO

Electrical Safety Orders of the State of California will be out in a new edition about mid-March. The revised orders were filed Feb. 9 with the Secretary of State and will require reprinting of the entire book because of many editorial changes.

400-amp delay

New electrical code for Los Angeles, after two years of work, seemed likely to be approved by the city council despite a last-minute objection raised to its requirement that all projects involving over 400 amp be engineered. This was protested by representatives of the Contractors Safety Assn., an independent group originally organized to handle group insurance for contractors. The 400-amp provision already exists in the preceding code.

Future building

IBEW's Local 1260 in Honolulu, largest of four in the Hawaiian Islands with a membership of 1,600, has bought 16,273 sq ft of property in Honolulu for a headquarters building. There are no immediate building plans. One of the old homes will be used as a union headquarters. J. Scott Milne, IBEW president, recently visited the islands to stimulate increased organization.

Timely reminders

"Oh, what a beautiful morning" opens the daily radio "Businessmen's News" sponsored by California Electric Works, San Diego, at 7:45 a.m. on station KGB. This advertising medium is timed to catch businessmen on their way to work driving their cars. News of the day and a short review of stock market quotations fit it particularly to businessmen. This is one of the many unique advertising ideas the California Electric Works public relations director, V. R. "Pinky" Knight, employs. Another, unusual for an electrical contractor, is a blotter advertising installed appliances on Title 1 FHA terms.

Sell-out promised

Los Angeles Home Show, set for June 9-19, Pan Pacific Auditorium, had already contracted 77% of its total exhibit space by Feb. 28. The show is run jointly by the building industries in southern California, among which are the Los Angeles Chapter, NECA.

Home appeal

"Research Home of 1955," a half-hour TV program on channel 11, KTTV, for 26 Sundays, began in February with the Los Angeles Chapter, NECA, as one of its sponsors. During the series three of the half-hour programs will be devoted to electrical facilities for the home, according to Warren Penn, executive vice-president.

Expands program

San Joaquin Chapter, NECA, has appointed Gil Frohlich as its manager. Frohlich formerly served as assistant manager of the northern California heating and piping contractors and was manager of the Utah-Idaho Chapter, NECA, until recently. The chapter elected J. E. McCarty, Brite Spot Electric Co., as its president; R. Goold as governor; Arthur De Manty of Manteca, vice-president, and Frank Trucco, Home Wiring Co., treasurer. A new office is in the new Builders Exchange Building at 1521 W. Oak St., Stockton. The program embraces one for more membership, educational courses and increased activity.

List of helps

Commercial and industrial wiring committee of PCEA is anxious to develop an index of all possible films, pamphlets, programs of promotion and publicity that can be used to stimulate rewiring of commercial and industrial premises, plant modernization, relighting, etc. It urges associations, manufacturers, individuals who have such information to register it with the committee through PCEA headquarters in Los Angeles, 530 W. Sixth St.

Clear up details

Seven official interpretations of the 1953 National Electrical Code have just been released by NFPA. These are in addition to the official interpretations previously released, several of which were published by NFPA in the 1954 National Fire Codes. Subjects covered include use of snap switches, isolating switches, anesthetizing locations and storage rooms, use of open-type fixtures, multiple fusing of motor circuits, construction of parallell cords and auto transformers.

Conference leader

L. C. Morrow, consulting engineer, Factory Management & Maintenance magazine, will again direct the conference in connection with the Western Plant Maintenance & Engineering Show July 12-14 at Pan Pacific Auditorium, Los Angeles. Morrow conducted last year's successful conference. This year's expanded show is expected to draw an even larger attendance of plant managers, production managers, plant engineers, maintenance and mechanical engineers, foremen, superintendents and top-level plant officials.

Volume vs profit

Two of the volume electrical contractors in San Diego went through bankruptcy proceedings recently. They were Pacific Electric Co. of Pacific Beach and RPM Electric Co. The latter filed suit against Electric Supply Distributing Co., charging that the latter's credit practices helped to destroy the firm's business.

Nothing less

"Demand at least a 100-amp main switch." Los Angeles Department of Water & Power is telling the public in a strong series of ads in the real estate sections of five dailies and two Sunday papers from Jan. 14 to June 26. This is supplemented with full-color car cards and bus cards, saying "With modern living you are using more and more electric appliances. Don't overload. Be modern. Demand at least a 100-amp main switch." The aim is to concentrate on this simple and easily remembered idea and thus increase public demand.

Coded

Colorado Springs and Billings, Mont., both now require 100-amp main switch as minimum for residences in their ordinances.

200-amp Spokane

But Washington Water Power, following the lead of B. C. Electric, has started to campaign for 200 amp as minimum for service entrance equipment. Kinsey Robinson, president, declares the 100-amp, three No. 2 service entrance is obsolete in that territory. With an average annual kwh of 6,910 and increased consumption, this can well be understood. More than 300 dealers in the Inland Empire Electric League and in NECA's chapter have set up committees to promote the 200-amp services.

Portland's success

William Tate, manager, appliance sales promotion, Portland General Electric Co., told the National Adequate Wiring conference, Feb. 24-25, in Chicago of that company's program with dealers and contractors to promote adequate wiring and the financing of it by the company in Oregon. Carleton Bunce, coordinator of the Contractors Division, San Diego Bureau of Home Appliances, also attended the conference. NAHB has prepared a bigger-than-ever campaign guide for the year 1955. It covers material for the home modernization market, the new home construction market for contractors, for dealers and for use in the educational field. Great stress is laid on the NAHB voluntary 100-amp minimum service requirement.

Top speaker

Eloquent Bob Gros, manager of advertising and publicity, PG and E, San Francisco, will be the principal speaker at the National Industrial Service Assn. banquet for its convention at Hotel Statler, Los Angeles, June 6-9. Early registrations indicate a huge crowd of motor shop owners from all over the nation will meet for the conferences and for the entertainment and tours being provided by the local committees, headed by W. H. Hogue, immediate past president.

Smog sifter

Electrical precipitation, first developed in the West by Dr. Cottrell, comes back to the West with the establishment of an office by Research-Cottrell Inc., a subsidiary of Research Corp., Bound Brook, N. J. An office has been set up at the 111 Sutter Bldg., Room 219, San Francisco, with W. H. Blessing as district sales manager for the West Coast and Canada. A recent catalog tells how industry uses the precipitators for smog control, recovery of materials, cleaning of industrial gases and air, etc.

Moving men

Names and changes: Charles H. Alden now represents Luminous Ceilings Inc. of Chicago in the San Francisco and northern California area. He was formerly with Crosley and then with W. J. Lancaster Co. He makes his office at 80 Lynnewood Drive, Daly City. Rube Lagerstrom, who formerly handled the line, is now consulting engineer for the company on luminous ceiling installations. He maintains his other lines such as Century . . . Al Parker now handles the Swivelier line, formerly handled by H. B. Squires Co., San Francisco. James Brundage has taken the Rambusch line . . . Ed Riley, who was associated with the late Sam Russell in H. B. Squires Co., has joined Fred Benz, representative for Magni Flood, Smithcraft, Miro-Flector and Accurate Insulated Wire . . . Dave Parker, San Francisco manufacturers' representative, now handles the Kirt Verson as well as the Ruby and Nimco lines of lighting equipment . . . Jack V. Knight has left California Electric Works to join James C. Brush, licensed and bonded collector in San Diego . . . Robert Prussia retired as representative of Corning Glass Co. in California and is succeeded by Arthur S. Tyler . . . Donald W. Close, electrical contractor of Seattle, has been named a member of the Young Presidents' organization in that city . . . Albert Jassim

has been advanced to president of Ruby Lighting Corp., Los Angeles . . . Frank Carr, formerly with California Electric Co., Oakland, and Walter Smithen, former vice-president of T. L. Rosenberg Co., have both joined Conrad Electric Co., Oakland . . . Leonard V. James, for 25 years with the Lamp Division of G-E, has joined Solar Light Mfg. Co. of Chicago and Los Angeles as technical consultant . . . Ralph C. Froehlich, formerly of Los Angeles, heads the new Phoenix office established by Micro Switch, a division of Minneapolis-Honeywell Regulator Co. . . . One-time Los Angeles district engineer for G-E Lamp, William H. Robinson Jr. has been made manager of marketing of the newly organized miniature lamp department of G-E Lamp Division. Edgar E. Coleman is the West Coast sales district representative.

Adopt, then teach

Alameda County, Calif., has adopted the model code prepared by the East Bay committee as of Feb. 1 and has been holding meetings to acquaint contractors and electrical workers with the code. W. C. Schwan, county inspector, has been conducting the meetings at Hayward High School Tuesday evenings.

Backfield shift

Southern California Edison Co.'s new commercial program has brought a number of changes to the lighting representatives. Leon Dame has been named supervisor of power development. Frank Rohring has been made industrial engineer. Roy Dahlin remains supervisor of lighting, a new title. He was coordinator of lighting development. Del Reynolds has moved to headquarters as lighting coordinator, John Dresden moves to Alhambra, Richard Eddy to Fullerton, William Krisman and Al Perry to Whittier. Earl Richards becomes a power consultant at Huntington Park and Del Shields is a power consultant at Covina. Dahlin plans a program of sales training for the company's own men. With new emphasis on selling instead of mere servicing of customer accounts, the work will be done on a division basis. A new batch of lighting consultants will be trained in late March.

Chief culprits

Of all electrical fires 14.95% are caused by defective installation of electrical equipment, according to the National Fire Protection Assn. quarterly study. Fires from defective installations in 1953 increased 187% over 1952. Worn-out equipment was the second most frequent cause, 13.95%. Television sets accounted for a great number of fires because of the number of heat-producing components.

Had you heard?

Interesting new products recently announced include: An aluminum alloy anchor by Diamond Expansion Bolt Co. of Garwood, N. Y., requiring smaller hole and less drilling . . . New Victor "Magic" clamps that snap on conduit for fastening it to walls or studding . . . A low-cost roof ventilator called Vertiflow made by Hartzell Propeller Fan Co. of Piqua, Ohio . . . New lower priced models of Lift-A-Dor automatic garage door operators, announced by Alliance Mfg. Co., priced at $69.95 . . . A wire joint kit packaged in a plastic box containing the new Sta-kon Plus pliers and pigtail connectors, announced by Thomas & Betts Co. It makes contents easily visible to contractors or maintenance men . . . A packaged Westinghouse Sterilamp, made up by Sampson Sun-Lite-Aire Co., made for insertion in conventional furnace duct systems . . . A new Autodor control with radio-frequency signals, announced by Engineered Instruments Inc. of 751 Soto St., Hayward, Calif . . . Thermador has entered the kitchen ventilator business with 9- and 11-in. vent fans . . . General Electric announces a new circuit breaker load center for service entrance equipment with snap-action spring clips. Added feature is straight-in wiring for terminal connections . . . New "Tube-Weld" connectors, couplings and off-set connectors introduced by Electric Tube Products of Maspeth, N. Y., made of one-piece steel tubing. Particularly new is the offset screw-type connector for EMT . . . Another flexible metal electric wiring conduit with a waterproof synthetic cover is being made by Universal Metal Hose Co. of Chicago.

NECA shorts

Rocky Mountain Chapter, NECA, in Denver discussed bid registration and bid depository at its Feb. 7 meeting. The East Central California Chapter in Fresno likewise is considering a bid depository, as is the Redwood Empire Chapter in San Rafael . . . Montana Chapter, NECA, heard A. T. Hutchinson, Biddle Trade Bureau representative for the Northwest, speak at its Jan. 22 meeting, giving A. H. Gudie's address to the Inland Empire Chapter, NECA, "Let's Have a Good Piece of Pie." Roswell L. Goodman is assistant chapter manager with office at 315 Allen St., Helena.

Good lighting and close harmony with architectural schemes result from careful planning in these prize-winning church lighting jobs

Blended Light for Beauty in Churches

Church lighting challenges illuminating engineers, who are faced with striking the proper balance of utility and decor in settings where an error is truly a "glaring" error.

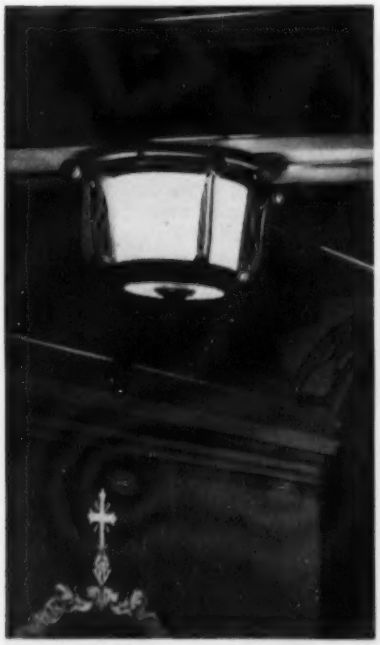
Churches demand lighting that blends with distinctive architecture. Our Lady, Queen of the Angels, Los Angeles, represents early Spanish colonial architecture; St. Anselm's, Vancouver, is modern. Both have new prize-winning lighting jobs.

Engineer Charles Brunner, Los Angeles Department of Water & Power, and Lou Black, Rambusch Decorating Co., highlighted newly restored gold art work by using gold Alzac reflectors on all the units in Our Lady, Queen of the Angels. Architectural lines were preserved by avoiding suspended or extended fixtures. Gibbs Bros. installed the lighting.

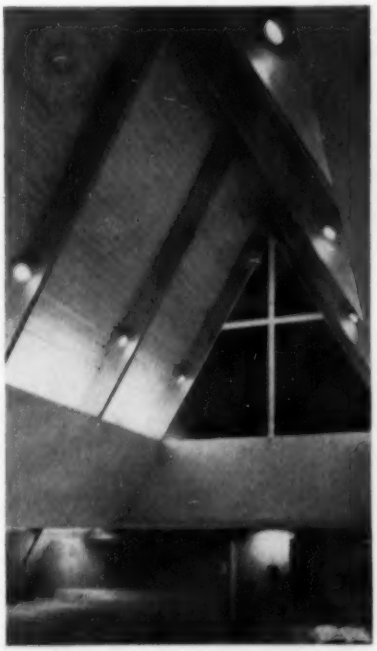
A proscenium arch framing the altar of Our Lady is emphasized by four PAR-R-40 floods concealed by forward columns. The shadowless altar area is lighted by: elliptical down lights with T lamps; two PAR-56 300-w spots, behind arch; four PAR-56 300-w floods recessed in the ceiling over altar and back wall; two medium-beam floods with gold reflectors in back corners of the arch and two more over the altar; a shovel-type unit to eliminate contrast and remove shadow. All units are serviced from above.

Consulting engineer E. E. Ackland of Vancouver lighted St. Anselm's church. He faced a triangular extreme in modern architecture by Semmens & Simpson and decided concealed lights provided the best solution.

Main down lighting is provided by truncated cones holding 150-w R-40 floods with 45° concentric louvers. Shadows are eliminated by placing cones 18 ft high, directed so beams cross at angles of 42° sideways and 38° forward. Brightness contrast is reduced with 8-ft single-lamp 300-ma warm-white slimline units at top and bottom of sidewall panels. Bottom units have 40° louvers, top units open. Two 300-w R-40 floods light the altar, a 300-w R-40 spot, the cross.



Fixtures have a 500-w downspot for reading



Proper angles eliminate glare toward pulpit

Luminous corrugated plastic diffusing system extends from outdoor marquee inside and over lobby. Also over the halls and stairways

New San Diego Library Goes Modern

Fortunately for San Diego's people the new library built to replace the greatly outgrown original Carnegie library on the site of the old one is completely modern in concept—and in lighting. None of the old traditional gloomy cloistered book-lined dungeons. The architects, Johnson, Hatch and Wulff, followed the advice of the electrical engineer, J. S. Hamel, to achieve really modern illumination. In a building in which seeing is the primary function, the design both of interiors and the lighting of them represents a truly modern approach.

Electrically the new library also represents modern equipment and facilities. Indeed the electrical contract of California Electric Works ran to nearly 20% of the $1,500,000 project that was two and a half years in construction.

Of the thinking back of the lighting design J. S. Hamel had this to say:

Lighting Design

"At the time the lighting of this building was first thought of, in the early design stages, considerable attention was given to the possibility of using a completely luminous ceiling area in all of the reading room areas. Study and analysis, however, of the conditions that were imposed upon the construction and cost of an installation of this type were such that it was felt the use of continuous luminous ceilings would have to be limited to certain areas for decorative purposes only and that the general illumination would be provided by another system, which we would call a limited luminous ceiling.

"Accordingly, the design of the general lighting units for this library is based on the following functional conditions: (1) the units would be relatively large in area; (2) brightness of the unit would be such that it would not be annoying or distracting to the occupants of the space; (3) the unit would provide a degree of luminosity on the ceiling immediately surrounding the fixture; (4) the unit would provide a uniform lighting intensity over the entire reading area of not less than 45 to 50 f-c.

"A fixture was designed consisting of a 4-ft-square Plexiglas dish having the above referred to design characteristics. While this job is a recently installed job, the design of the lighting fixtures took place during the period of 1949 and 1950. At that time there were no 4-ft-square plastic fixtures being made and the design of this unit was in a sense a pioneering design in this particular phase of illumination. In the preliminary design of this work, a sample of the 4-ft-square fixture was made and tested.

Cold cathode sign tubing is light source

"This sample was checked as to brightness and to lighting output and the final designs were based on results obtained from the handmade sample. The results obtained from the lighting were as follows: initial foot-candles in all reading room areas 60 to 65 f-c. It is estimated that, because of depreciation over a period of time, this will drop to 50 f-c approximately to meet the design requirements for minimum lighting intensity.

"The entrance area of the library, including the foyer and the book return areas, was lighted with the continuous luminous ceiling. This luminous ceiling, constructed of corrugated Plexiglas and backlighted with cold cathode fluorescent tubes of 60- and 120-ma intensity, forms a continuous area of uniform brightness extending from the outer edge of the marquee into the building. This same character of illumination was repeated in the main stairwell areas and on the second and third floor public corridor areas. The results achieved with the cold cathode fluorescent in these areas were excellent. The quality of light was good and the brightness of the ceiling was approximately 250 f-l. The gen-

Four-foot-square Leadlight Plexiglas ceiling mounted units, lacquer treated, were designed especially for the reading areas and provide 70 f-c of general illumination

eral lighting intensities at 30 in. above the floor by this luminous ceiling area averaged 35 f-c.

"In corridors and other miscellaneous rooms, the same character of illumination was carried on throughout although fixture sizes were reduced to the following proportions: in corridors, two-lamp 12 in. wide by 48 in. long; in newspaper rooms and other areas where continuous lines of illumination were required for the illumination of bookshelves along the walls, 12-in.-wide, two-lamp units recessed into the ceiling were used end to end in continuous lines forming a border pattern around these rooms.

"Stack area lighting was accomplished through the use of a conventional incandescent lamp with the butterfly-type reflector baffles. This still provides the most economical and generally a very satisfactory way of illuminating the large general stack areas.

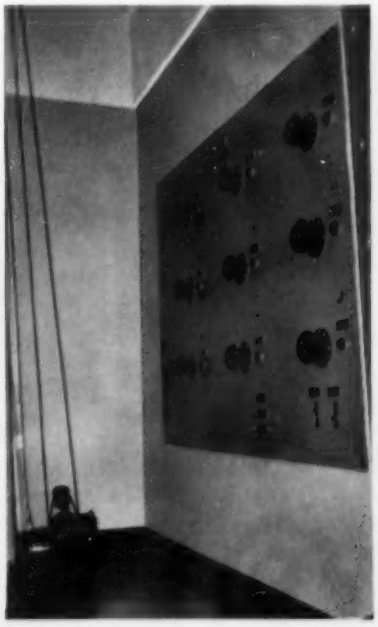
"In the general office areas, continuous lines of 4-ft, three- and four-lamp fluorescent fixtures, using a Plexiglas diffusing dish projecting approximately 2 in. below the ceiling, were used. These Plexiglas dishes consisted of 1/16-in. diffusing Plexiglas, having a density adequate to eliminate any striations from the lamp images. The general lighting intensity provided in the office areas by this method of illumination range from 50 to 75 f-c.

"A feature of the Plexiglas fixtures was the application of a special polystyrene lacquer to eliminate the glassy surface of the large fixtures. This eliminated the specular reflections and enhanced the appearance of the Plexiglas.

"Credit is due to the Atkinson Enterprises of Los Angeles who developed the lacquer application and who molded all of the 4x4-ft Plexiglas fixtures. They were manufactured by Leadlight Fixture Co. of Oakland."

Other Electrical Features

Main service to the library comes from a power vault in the street over three 800-amp, 120/240-v bus ducts, for the three phases of lighting and a 800-amp, 240-v, three-phase for power. Insufficient room was allowed for the main switchboard as originally laid out, especially headroom to bring the feeders in at the top. Hence the contractors had to redesign the plan and bring the bus ducts in at the rear of the boards as shown in the photographs. And in order to have space to bring out the circuits from the main panels a channel was sunk in the floor below the panels and in front of them. Through this the circuits are taken to a pull box against the rear wall into which the major conduit runs terminate.



Both the auditorium and the stage lighting can be controlled from this dimmer panel off stage. Curtain is motor operated also

Low ceiling for switchboard room necessitated feed from the back, distribution from a floor trench in front of the main panels

For emergency lighting a tap is taken off of phase C to an emergency panel on the wall facing the phase panels. If phase C should go out there is an automatic throwover to phase B. This emergency system carries exit lights, corridors, theater aisle lights. Capacity of the emergency system is 150 amp.

All of the main area lighting is remotely controlled from key switches which actuate contactors.

Two auditoriums are an unusual feature of this library. The larger is for lectures, panel discussions and even recitals or plays. It is well equipped for lighting a variety of needs. The house lights include a series of coves in which is mounted a white cold cathode tubing. Each cove is independently switched if wanted or can be combined with other lighting on the dimmer controls. There are also 150-w reflector floor lamps set flush in the ceiling for downlighting. The clock at the rear is spotlighted.

On the stage there are four sections of border lights on dimmers and a spotlight out in front of the proscenium on each side directed at the stage. The curtain is motor operated from the side also. House lights can be operated from either the stage or the doors at the rear.

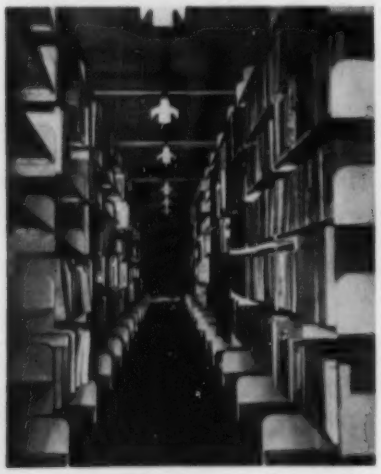
The small auditorium, a children's story room, is provided with movie projector and a Superior dimmer for each of two 1,000-w concentric ring incandescent fixtures. A puppet stage in the children's reading room has footlights in three colors.

Decorative custom-made fixtures by Wagner-Woodruff are used in the special library called the Wagenheim room and in the conference room. These combine both upward and down light, the lower part of the unit fitted with rose-tinted louvers. To light the planter box along the railing of the balcony facing E Street at the third floor, and also spill patterns of light on the building face, a row of 75-w Crouse-Hinds waterproof units were set at 7-ft intervals in the planter box.

Light colors were used throughout for better reflectivity and cheerful atmosphere. Ceilings are white. Walls are light peach and light green. The floors are a light tan. In the conference room and special library the wood paneling is light in tone and furniture finishes also.

The lighting load amounts to 2.6 w per sq ft, producing 27 f-c per sq ft.

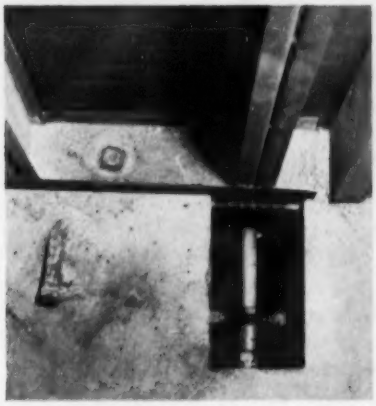
Superintending the electrical installation was Charles A. Berryman, one of the owner group of California Electric Works, San Diego. In addition to the lighting described there was also installed an IBM master clock system.



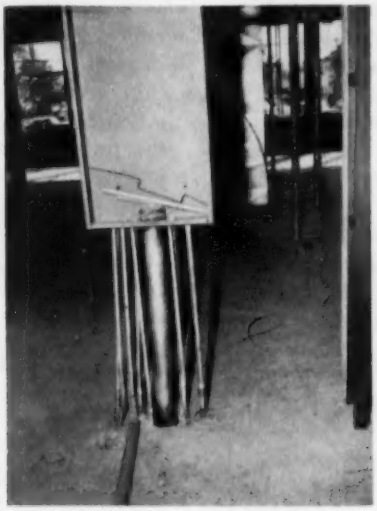
Large basement stack area uses stack units

Footlights of children's room puppet stage

Lift Slab Wiring Calls for Ingenuity

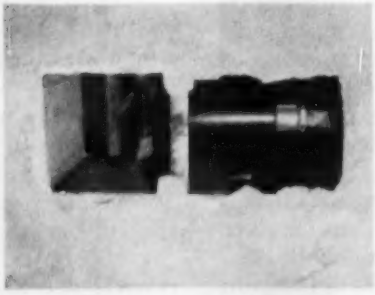


Stub here for bookcase lights was covered with plaster of Paris. (Impression of it in the upper slab seen above. This was later filled in with cement.) Box was placed around end of conduit run in floor so that connection could be made to adjoining slab



At panel locations where a number of runs were stubbed up and where the feeder conduit needed to be installed later, a box was put around the stubs, filled with sand. The slab for the next floor was cast around it. This later also allowed for runs from that panel up through the aperture to the next floor for another panel. When finished, these ports in the concrete slab were filled with concrete and smoothed with the floor and ceiling finish. No furring was used

Where an outlet box had to protrude above a floor slab for case lighting, a sheet metal drain pipe was put around it and filled with sand. Pipe is seen in ceiling above when up



Conduit run to a box filled with sand at a location over a partition seen below through the port. Connection made to it from the conduit runs down the partition by means of a pressure fitting as illustrated here

Lift slab is a new type of concrete construction that provides some cost and construction advantages to the builder but poses some tricky problems for the electrical contractor. Especially is this so when the conduit for its wiring is to be cast into the slabs and not clamped to them afterward as may be done in warehouse or industrial occupancies or even where ceilings or walls are furred. When the slabs are sectional and require the joining of conduit runs between the sections after the slabs are lifted in place and where stubs are necessary to supply panels or equipment at designated locations the matter calls for ingenuity.

Although Martin Memorial Library at College of the Pacific, in Stockton, when finished will match the other Gothic buildings of the campus its construction was by this modern lift slab method. And as engineered by Scott Beamer, consulting engineer, a large number of its outlets were necessarily located in the flat slabs. The slabs were raised in two parts. There were a number of stub-ups at several locations and especially at panel locations. The first, second floor and roof slabs were cast in succession on top of each other, then lifted. The sections were about 80 ft long and each slab was 10 in. thick with ½- and ¾-in. reinforcing rods in a structural meshwork.

Some of the problems were met in the design. But the electrical contractor, R. Goold & Sons, with R. W. Smith, superintendent, and Foremen Kerr and John Lawler, had to work out installing methods, some of which are illustrated here.

Extra deep concrete boxes with cover plates were selected for ceiling outlets. The locations of boxes, stubs, panels, etc., were all marked on the first floor slab. The boxes were set in place, conduit run to them and both anchored as much as possible to the reinforcing rods. Where the stub could later be reached at the surface it was kept to a 9-in. height to come out flush with the bottom of the next slab. Where a stub had to be made up above the floor a sheet metal sleeve made of drain pipe was put around it so that it would be free of the next slab cast above. Where several stubs were made a wooden box was set over them. Such boxes were filled with sand, then after connections were made filled with concrete level with the slabs. Similarly sheet metal sleeves were filled to finish the slabs smoothly for floor or ceiling.

ELECTRICAL WEST

A Built-In Market for Contractors

THE rich stake that an alert electrical contractor can have in a fully electrified home was brought home recently when we inspected a model house. We counted fourteen built-in appliances without including the heating installation. Here is a promising source of premium business for the contractor who is willing to sell the advantages of this new and modern type of appliance. The list runs from TV sets to freezers and refrigerators and range tops, ovens and broilers. Dishwashers, laundry equipment and air conditioners are also included.

More and more manufacturers are coming out with complete lines of built-in appliances, many in new, bright colors. Also national promotion is building customer demand and acceptance for them.

Built-in appliances also can prove to be the real lead-in for wiring remodeling. An adequate wiring job can be built around the installation of new kitchen equipment, a bathroom heater, a built-in TV set and other appliances.

All of this can mean new business for the residential wiring contractor. Now he can sell appliances as well as install them and thus broaden his market and expand his income.

Partners in Theory

IF Congress would take cognizance of the grassroots sentiment for implementation of the partnership power development concept instead of accepting the arguments of Senators Newberger and Morse for more federal power bureaucracy, the future electric energy supply of the Pacific Northwest might be assured. Last month the Oregon State Legislature sent to Congress two memorials endorsing partnership plans for river development projects. Meanwhile both Senators argued for a high dam at Hells Canyon.

One memorial calls for partnership construction of flood control and power projects on the Santiam and McKenzie rivers. Pacific Power & Light Co. has expressed a willingness to finance and construct the 96,000-kw power phase of the Green Peter site on the Santiam. The city of Eugene wants a partnership agreement for building the 37,000-kw Cougar site on the McKenzie. Both are ready to proceed immediately. All that is needed is Congressional okay.

The second memorial urges immediate construction of the 1,100,000-kw John Day project on the Columbia. It asks that legislation be enacted to permit local agencies to advance funds for engineering of this job if the federal government itself does not propose to undertake it.

Until Congress does something about it, the partnership concept will be purely theory instead of a practical reality.

Some Gas or No Gas

EVERY once in a while the well deserved and continually increasing popularity of electric cookery throws the gas people into a semihysterical tizzy. Latest development is the reaction to the increasing use of built-in range cooking tops and ovens by large-scale home builders as a prime merchandising aid in the sale of their houses to the public. As a means of retaliating, the gas folks have invoked a rule calling for an average of $55 per home for the installation of gas service facilities when the home is to be equipped with an electric range. Naturally the tract developers are objecting strenuously to this so-called "advance in aid of construction." Their ire is further aroused by the frank announcement that the gas utility will refund the $55 if a gas range is installed.

Obviously invocation of the rule is a defensive measure aimed at holding as much of the home services for gas as is possible. Economic arguments based upon rate-making theory can be advanced to justify the practice. And regulatory commission approval can be cited as well. However, we seriously doubt if, in the long run, the practice will accomplish its purpose. No defensive measure of this sort ever has. It fosters ill-will by challenging the good judgment of the

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customer and by penalizing him for his choice. That never has proved to be sound merchandising.

It too can instigate retaliation. One home builder has announced plans for a new tract of 431 homes with not a foot of gas pipe in the subdivision. Not only will the kitchens and laundries be all-electric, but heating and air conditioning will be provided by heat pumps.

The gas people can expect more of this competition.

Protecting the Wage Rate

OFFICERS of electrical contractors associations seem to be having a hard time to get their members to attend meetings. Some have been especially embarrassed by a poor turnout to well-publicized meetings to acquaint them with the selling programs they have sought so long to obtain from the other branches of the industry. Despite the fact that business is harder to get and that bidding for it is bitter and unrewarding, the promotions designed to aid them in selling wiring profitably are going begging.

Never in the long history of this publication in the West has the entire industry been so aroused to the need to help sell more adequate wiring and so willing to spend money promoting this through the contractors. The hard working officers of these associations have wished for, pleaded, urged and finally sold the utility companies, the manufacturers and distributors, even the retail dealers to promote wiring. All of it can mean business for the contractors and man-hours of work for their electricians.

Maybe, since contractors do listen to the union and give it almost everything it asks for, it is up to the union to tell the contractors in hard-boiled terms to get to these sales meetings and learn to sell wiring just as a protection to the wage scales the union has won from them. Certainly if contractors keep cutting bids as they are there won't be enough left to meet the pay roll soon. What glory is there to a wage scale if nobody is sold to buy it?

You Can Say That Again

THE prevailing economic philosophy in all the free countries today is an expansionist philosophy . . . By that I mean a policy which has for its objectives high level employment and rising standards of living. That means, in practice, an economy of increased capital investment, yielding a constant rise in the output of goods and services per man-hour of work. Such an economy can only be achieved in peacetime by expanding consumption. So an expanding economy requires not only increased production but higher wages and greater leisure so that people can buy and consume the increased output of goods and services. Does all of this sound familiar? It is indeed. An expansionist economy in a free country is simply what we know here as the American way of life . . . The greatest single contribution the United States can make to the Age of Expansion will be, of course, to carry forward its own economic growth and set the pace in rising living standards. This is well within our power. Our economy is poised for a great new forward thrust. We have a skilled and growing labor force; the most productive industrial plant in the world; a strong financial system; a high level of income and savings, widely diffused among our people. American industry has begun to throw its great energy and resources more heavily than ever before into research . . . Technologically and industrially we have only scratched the surface. Most important of all, as a people, we are prepared psychologically for great changes—we have no group of monied interests, of peasants, of entrenched landlords—no significant group at all in America today that is holding back from the future or trying to turn back the clock.—Elliott V. Bell, editor and publisher, "Business Week."

1954 Sales Record Summarized by Utilities

While the following figures follow Federal Power Commission classifications insofar as possible, some clarification given by reporting utilities will help in their interpretation.

Alaska Electric Light & Power reports that it has a multiple meter system and keeps its records by number of meters, not customers.

Figures listed under the public authority classification for Arizona Public Service Co. are its government and municipal customer figures, which include street lighting and public authority accounts.

B. C. Electric, Vancouver, has no separate breakdown for residential and rural customers or public authority accounts. The latter are included in commercial and industrial classifications.

California-Pacific Utilities Co. reports that the 35% increase in average residential kwh use within the past four years is only a part of the growth story on the rural areas it serves. In the residential classification the average kwh use per customer in 1945 was

Customers and Residential Consumption

Utility Territory	Average Annual Kwh, Residential 1954	1953	1952	1951	Residential 1954	1953	Rural 1954	1953	Commercial 1954	1953
Alameda PU Dept.	2,069[1]	1,874[1]	1,788	1,757	13,159	13,026	...	...	1,265	1,292
Alaska EL&P	1,645[16]	...	...	...	4,786	...	373	...	831	...
Arizona PS	2,570	2,370	2,262	2,049	109,246	104,540	...	...	20,239	19,367
Benton-Lincoln Elec. Co-op.	6,250	5,510	4,905	4,150	4,350‡	4,253‡	...	...	273††	268††
B. C. Elec., Vancouver	3,441	3,039	2,782	2,550	183,958	175,580	...	...	29,836	28,628
B. C. Elec., Victoria	2,998	2,672	2,451	2,281	28,960	27,965	9,560**	8,976**	6,099	5,824
B. C. Power Com., Victoria	2,580	2,076	1,812	1,512	47,031	43,873	...	...	7,774	7,406
Burbank PS Dept.	2,140	2,035	1,945	1,830	29,890	28,858	...	...	4,745	4,335
Calif. Elec. Power	2,130	2,044	2,006	1,831	60,870	56,282	2,115	2,123	10,802	10,190
Calif. Oregon Power	7,509	7,332	6,738	5,790	67,062	64,725	1,275***	1,207***	13,437	13,065
Calif.-Pacific Utilities	4,952	4,817	4,346	3,687	21,878	21,581	2,512	2,547	4,689	4,565
Central Lincoln PUD, Newport	7,312	6,634	5,698	4,404	8,666	8,460	8†	8†	1,783	1,755
Cheyenne LF&P	...	...	...	...	...	...	...	...	...	...
Colorado Central Power	2,177	2,139	1,919	1,845	14,996	14,178	6,341	4,605	1,767	1,720
Elko-Lamoille Power	1,891	1,779	1,625	1,479	1,831	1,807	113	99	506	511
El Paso Elec.	2,527	2,382	2,185	2,016	62,019	56,494	271	277	8,233	7,748
Ely L&P	1,608	1,529	1,429	1,307	1,636	1,432	9	9	484	466
Eugene Water & Elec. Bd.	7,533	6,988	6,735	6,359	19,669	18,670	...	...	3,455††	2,648
Fort Collins L&P Dept.	165	154	151	149	5,012	4,856	554	530	221	214
Frontier Power	1,558	1,465	1,339	1,222	2,826	2,730	1,533	1,512	570	571
Glendale PS Dept.	1,929	1,910	1,869	1,721	36,499	35,741	5,384	5,239	...	...
Hawaiian Elec.	3,501	3,221	3,076	2,867	73,114‡	70,330‡	...	...	14,935	14,727
Helper L&P Dept.	500	450	400	350	800	800	...	...	295	295
Hilo Elec. Light	2,303	1,973	2,110	1,925	5,798	5,695	7,141	7,098	2,800	2,730
Home L & P, Greeley	2,795	2,662	2,499	2,437	7,795	7,443	3,132	3,040	2,472	2,380
Idaho Power	5,364	5,081	4,961	4,620	75,035	73,433	28,051	27,706	18,485	17,830
Imperial Irrig. Dist.	4,891	4,500	4,455	3,958	20,722	20,119	947***	946***	4,547	4,420
Ketchikan PU	5,463	5,893	5,485	5,278	2,242	2,074	313	267	532	506
Lahaina L&P	2,888.45	2,797.50	2,623.26	2,278.27	1,343	1,329	...	...	182	187
Lane County Elec. Co-op, Eugene	6,516	6,024	5,880	4,776	3,686	3,626	816	812	303	296
Los Angeles Dept. of W&P	1,944[2]	1,865	1,804	1,651	658,747	637,217	...	...	120,616	118,626
Maui Elec.	2,688	2,532	2,412	2,268	8,587	7,822	...	...	1,506	1,442
Modesto Irrig. Dist.	3,150	2,980	2,800	2,635	19,938‡	19,314‡	514	448	2,492	2,375
Montana Power	2,942	2,672	2,519	2,315	113,234	110,240	15,444†	14,823†	16,749	16,281
PG & E	2,458	2,340	2,281	2,092	1,019,646	956,032	343,751[8]	318,664[8]	211,311	201,564
Pacific P&L	5,622	5,170	4,920	4,537	196,144	192,597	27,614	26,645	32,441	31,927
Palo Alto MU	2,202	2,066	...	...	11,446	10,724	...	...	1,992	1,853
Pasadena L&P Dept.	1,925	1,846	1,760	1,650	39,493	38,575	...	...	6,008	6,109
Portland GE	6,929	6,228	5,966	5,543	198,556	195,079	...	...	25,601††	25,166††
Provo Dept. of Utilities	2,852	2,891	2,716	2,595	7,520	7,322	...	...	1,018	1,107
PS of Colorado	2,007	1,874	1,722	1,643	209,768	197,870	23,439	17,235	29,985	28,461
PS of N. M.	1,866	1,735	1,530	1,402	65,163	62,038	395†	343†	9,087††	9,220††
PUD No. 1 of Chelan Co., Wash.	5,392	5,361	5,182	4,780	7,045	7,012	3,722	3,719	1,410	1,060
PUD No. 1 of Clark Co., Wash.	7,206	6,485	6,051	5,647	16,393	15,810	8,324	8,124	2,829	2,929
PUD No. 1 of Cowlitz Co., Wash.	8,907	7,502	6,440	...	17,130	17,340	6,119	...	1,882	2,141
PUD No. 1 of Franklin Co., Wash.	7,228	6,642	6,350	5,700	5,137	4,895	80†	74†	1,217††	1,074††
PUD No. 2 of Grant Co., Wash.	10,612	8,740	8,251	7,838	4,870	4,468	3,322	2,790	1,977	1,650
PUD No. 1 of Grays Harbor Co., Wash.	6,295	5,583	5,089	4,611	11,828	11,738	4,795**	4,685**	3,577	3,521
PUD No. 1 of Lewis Co., Wash.	6,192	5,442	4,978	4,402	10,373‡	10,413‡	...	...	1,000	1,046
PUD No. 3 of Mason Co., Wash.	6,072	5,576	5,179	4,685	4,927	4,740	...	...	443	444
PUD No. 1 of Snohomish Co., Wash.	5,857	5,254	4,844	4,352	44,196‡	41,764‡	...	...	4,300	4,246
Puget Sound P&L	5,854	5,223	4,935	4,722	159,228	154,873	...	7	16,428	15,875
Raton PS	2,920	2,876	2,610	2,300	2,341	2,333	...	...	383	412
Rawlins Elec.	2,200	2,100	2,000	1,750	2,700	2,500	75	75	300	300
Riverside PU Dept.	2,508	2,352	2,399	2,376	20,012	18,291	...	...	1,902	1,858
Sacramento MUD	2,688	2,495	2,351	2,193	96,665	92,092	3,784	3,766	13,503††	13,046††
Salt River Power Dist.	3,835	3,575	3,545	3,486	36,845‡	31,836‡	...	...	2,681	2,428
San Diego G&E	2,395	2,296	2,244	2,005	154,035	146,066	56,109	53,062	27,229	26,340
Seattle Lighting Dept.	7,078	6,485	6,312	5,766	190,221	187,234	...	...	24,880	25,245
Sierra Pacific Power	4,274	4,073	3,857	3,602	25,801	24,508	755	734	4,676	4,319
Southern Calif. Edison	1,931	1,829	1,739	1,585	1,036,403	970,156	22,450	21,367	128,986	127,084
Southern Colorado Power	1,957	1,882	1,775	1,734	32,018	31,131	4,424	4,433	5,418	5,455
Southern Nevada Power	9,821	9,502	10,379	9,428	18,707	14,432	...	...	6,250	5,191
Southern Utah Power	4,161	4,016	3,765	3,374	3,722	3,615	135	135	719	676
Southwestern PS	1,850	1,690	1,590	1,465	123,204	117,992	11,975	11,497	25,541	24,672
Tacoma PU Dept.	8,212	7,244	7,077	6,730	51,398	50,493	...	...	5,755	5,678
Telluride Power	3,631	3,300	3,094	2,693	7,518‡	7,582‡	...	...	1,557	1,582
Tucson GL&P	2,139	2,093	1,945	1,778	47,301	44,250	364†	315†	7,957	7,865
Uintah P&L	3,972	3,775	3,537	3,236	1,084	1,053	...	...	310	295
Utah P&L	3,545	3,416	3,180	2,935	168,536	164,065	...	...	18,071	17,519
Washington Water Power	6,910	6,371	6,182	5,803	93,906	90,734	20,471	19,742	13,929	13,598
Western PS	2,033	1,868	1,671	1,514	4,493	4,342	45	45	701	673

* Includes street lighting
** Domestic.
*** Agricultural.
† Irrigation.
†† Includes industrial.
‡ Includes rural.
[1] As of June 30.
[2] Excludes flat water heater accounts.
[8] Miscellaneous.
[16] Interdepartmental.

1,276; in 1949, 2,984; in 1950, 3,322. The five-year increase is 160%; the nine-year increase, 278%.

The total for Lane County Electric Co-op includes 20 irrigation and 60 public building accounts not listed in the table.

Los Angeles Department of Water & Power figures are for the 12 months ending Nov. 30 and the ones for the commercial classification include governmental and accounts of the department's water system, 250 in 1954, 289 in 1953.

Estimated Number of Customers by States

State	Total	Residential	Rural	SLP*	LLP†
Arizona	243,561	207,129	852	33,305	1,627
California	4,244,837	3,460,790	148,005	573,091	44,183
Colorado	470,267	378,624	24,892	56,575	8,348
Idaho	205,551	169,780	8,315	26,740	391
Montana	199,560	171,478	...	25,126	2,359
Nevada	63,670	51,963	...	11,496	92
New Mexico	195,392	163,299	3,537	27,071	833
Oregon	554,639	464,360	12,537	73,982	1,514
Utah	218,963	196,104	82	20,072	2,025
Washington	844,319	716,221	25,489	97,010	3,278
Wyoming	95,637	79,709	1,385	12,819	1,481

Source: Edison Electric Institute. * Small light and power † Large light and power.

Customers and Residential Consumption

Industrial 1954	Industrial 1953	Street Lighting 1954	Street Lighting 1953	Public Authorities 1954	Public Authorities 1953	Other Electric Utilities 1954	Other Electric Utilities 1953	Total 1954	Total 1953	Utility Territory
337	349	2	2	134	137	...	...	14,897	14,804	Alameda PU Dept.
...	...	8	...	155	...	1	0	6,154	...	Alaska EL&P
1,533	1,377	...	...	277[9]	306[9]	7	6	131,302	125,596	Arizona PS
...	...	1	...	0	0	1	1	4,625	4,522	Benton-Lincoln Elec. Co-op.
4,337	4,124	32	30	...	...	...	...	218,163	208,362	B. C. Elec., Vancouver
596	601	6	6	...	...	...	...	45,221[2]	43,372[2]	B. C. Elec., Victoria
1,013	967	79	74	...	...	...	...	55,897	52,319	B. C. Power Com., Victoria
19	19	1	1	330	330	2	2	34,987	33,545	Burbank PS Dept.
246	260	100	111	16	14	8	8	74,157	68,988	Calif. Elec. Power
403	381	88	86	65	60	5	5	82,335	79,529	Calif. Oregon Power
28	20	42	55	16	14	1	1	29,166	28,783	Calif.-Pacific Utilities
47	45	10	10	...	...	...	...	10,514	10,278	Central Lincoln PUD, Newport
										Cheyenne LF&P
45	38	14	14	194	156	1	2	23,358	20,713	Colorado Central Power
...	...	1	1	1	1	...	...	2,452	2,419	Elko-Lamoille Power
194	195	...	...	503[8]	504[8]	...	...	71,220	65,218	El Paso Elec.
...	...	...	...	9	9	...	...	2,138	1,916	Ely L&P
...	723	2	2	...	...	...	1	23,126	22,044	Eugene Water & Elec. Bd.
107	101	10	10	58	56	...	...	5,962	5,767	Fort Collins L&P Dept.
11	11	3	3	3	3	4	5	4,950	4,835	Frontier Power
...	...	...	...	...	...	...	...	...	...	Glendale PS Dept.
94	83	112	111	...	...	...	...	88,255	85,251	Hawaiian Elec.
...	...	1	1	4	4	...	...	1,100	1,100	Helper L&P Dept.
263	280	1	1	...	...	...	...	16,003	15,804	Hilo Elec. Light
14	12	10	10	...	...	...	...	13,423	12,885	Home L&P, Greeley
99	97	139	135	...	...	5	5	121,814	119,206	Idaho Power
872	844	12	18	162	155	168[6]	147[6]	27,430	26,649	Imperial Irrig. Dist.
10	11	1	1	1	1	...	...	3,099	2,862	Ketchikan PU
...	...	1	1	...	...	...	...	1,526	1,517	Lahaina L&P
14	18	2	2	...	...	...	...	4,903	4,754	Lane County Elec. Co-op, Eugene
8,835	8,742	1,553	1,495	...	...	3	4	789,754	766,084	Los Angeles Dept. of W&P
308	298	91	84	...	...	...	...	10,492	9,646	Maui Elec.
732	778	29	28	96	103	1	1	23,802	23,047	Modesto Irrig. Dist.
2,294	2,269	402	377	10	11	52	49	148,185	144,050	Montana Power
36,630	36,302	866	815	23	27	31	33	1,612,263[9]	1,513,442[9]	PG and E
4,264	4,433	...	...	786[9]	729[9]	8	8	261,257	256,339	Pacific P&L
...	...	...	...	...	...	...	...	13,438	12,577	Palo Alto MU
50	49	15	14	152	149	...	...	45,718	44,896	Pasadena L&P Dept.
67[10]	74[10]	191	186	1,102	1,112	1[11]	1[11]	225,518	221,618	Portland GE
14	13	5	5	...	...	...	...	8,557	8,447	Provo Dept. of Utilities
7,561	7,261	85	83	1,038	984	10	11	271,886	251,905	PS of Colorado
...	...	8	8	14	15	1	1	74,667	71,622	PS of N. M.
31	314	8	8	7	7	3	3	12,226	12,123	PUD No. 1 of Chelan Co., Wash.
8	8	24	22	95	86	3	3	29,833	29,267	PUD No. 1 of Clark Co., Wash.
7	8	6	8	2	3	1	1	25,147	19,501	PUD No. 1 of Cowlitz Co., Wash.
...	...	3	3	...	...	...	...	6,437	6,046	PUD No. 1 of Franklin Co., Wash.
...	...	8	8	7	7	...	...	10,184	8,923	PUD No. 2 of Grant Co., Wash.
19	22	63	61	194	185	1	1	20,477	20,213	PUD No. 1 of Grays Harbor Co., Wash.
46	43	13	13	296	285	...	...	11,728	11,800	PUD No. 1 of Lewis Co., Wash.
1	1	7	7	3	3	...	...	5,381	5,195	PUD No. 3 of Mason Co., Wash.
114	112	15	14	23	24	2	2	48,650	46,162	PUD No. 1 of Snohomish Co., Wash.
326	351	129	128	148	142	13[13]	13[13]	176,272	171,389	Puget Sound P&L
280	284	1	1	...	...	...	...	3,005	3,030	Raton PS
...	...	1	1	...	...	...	...	3,076	2,876	Rawlins Elec.
665	644	...	...	...	...	...	...	...	...	Riverside PU Elec.
...	...	90	84	...	...	1	1	114,043	108,989	Sacramento MUD
260	250	5	3	126	121	6	6	39,923	34,644	Salt River Power Dist.
638	589	231	225	13	13	10	9	238,265	226,304	San Diego G&E
315	266	3	3	1,157	1,233	...	1	216,576	213,982	Seattle Lighting Dept.
87	88	23	23	9	8	5	5	31,356	29,685	Sierra Pacific Power
27,266	26,612	2	2	9,755	9,260	8	8	1,224,870	1,154,489	Southern Calif. Edison
74	77	20	20	17	17	7	7	42,103	41,236	Southern Colorado Power
6	6	2	2	3	3	...	...	24,968	19,634	Southern Nevada Power
37	37	14	14	1	1	4	4	4,632	4,482	Southern Utah Power
1,730	1,720	102	94	900	829	89	85	163,541	156,889	Southwestern PS
1,254	1,254	27	28	...	...	18[12]	16[12]	58,452	57,469	Tacoma PU Dept.
22	25	38	31	248	248	15	13	9,398	9,481	Telluride Power
100	79	4	4	2	2	...	...	55,728	52,515	Tucson GL&P
6	6	5	5	...	...	...	...	1,405	1,359	Uintah P&L
2,607	2,435	381	382	71	71	36	37	189,702	184,509	Utah P&L
694	703	230	213	...	...	14	15	129,244	125,005	Washington Water Power
43	38	1	1	3	1	...	...	5,285	5,100	Western PS

[2] Approximately.
[6] Includes governmental.
[7] Included in other classes of service.
[8] Domestic and agricultural.
[9] Includes 5 miscellaneous.
[10] Large, primary metering.
[11] Railroads.
[12] Includes railroad.
[13] Includes public authorities.
[14] Meters.

PG and E rural figures include the following in the agricultural 306 classification: 67,607 for 1954; 63,463, 1953. The remainder are domestic 303. Total includes five miscellaneous. Its residential kwh consumption figure includes master metered apartments.

Pacific Power & Light data excludes duplicate customers.

Portland GE includes its rural customers in other classifications.

Public Service of Colorado breaks down its rural figures as follows: 1954—rural residential, 23,199; rural, 240; 1953—rural residential, 17,120; rural, 115.

City of Riverside explains that average kwh figure is low because it had set a large number of meters in three tracts that were not in use when the figures were compiled.

Sacramento MUD includes public authorities in its commercial and industrial classification.

Southern Colorado Power points out that some consolidation of meters for individual customers results in error in comparing 1953 and 1954. In its residential and rural figures it has removed water heater duplication but some other duplication still exists. The company, for instance, does not separate rural farm from rural nonfarm and

Appliance Sales

	Domestic Customers	Refrigerators	Ranges	Water Heaters	Freezers	CLM Lamp Sales	Room Conditioners	Washers Automatic	Washers Conventional
ALASKA									
Alaska EL&P	...	23	30	11	3	...	...	8	5
Ketchikan PU	2,242	...	...	...	...	...	...	...	...
ARIZONA									
Arizona PS	109,246	11,117	1,702	784	1,544	18,601	2,406	6,341	4,529
Salt River Power Dist	36,845	650	300	125	400	...	660‡	350	200
Tucson G&EP	47,301	2,000	500	125	250	...	250	1,600	750
BRITISH COLUMBIA									
B. C. Elec., Vancouver	183,958	18,969	10,551	10,528*	954	...	...	3,100	9,185
B. C. Elec., Victoria	38,520	3,821	1,555	538	455	...	62†	742	1,440
B. C. Power Com., Victoria	47,031	...	...	...	...	...	...	...	...
CALIFORNIA									
Alameda PU Dept.	13,159	250	259	9	100	...	...	170	75
Burbank PS Dept.	29,890	340	280	20	25	...	250	325	100
Calif. Elec. Power	60,870	2,563	592	370	171	...	375	2,000	1,012
Calif.-Pacific Utilities	21,878	1,151	1,052	784	608	...	135	...	...
Glendale PS Dept.	36,499	...	453	53	...	...	...	...	...
Imperial Irrig. Dist.	20,722	1,500	400	150	240	...	1,400	1,000	800
Los Angeles Dept. of L&P	658,747	...	4,000	1,800	...	...	...	...	...
Modesto Irrig. Dist.	19,938	...	...	...	...	...	...	...	...
PG and E	1,295,790	67,618	22,058	5,990	13,199	...	3,155	70,848	21,307
Palo Alto	11,446	...	...	...	...	...	...	...	...
Pasadena L&P Dept.	39,493	...	638	74	...	...	...	...	...
Riverside PU Dept.	20,012	...	683	45	...	...	...	...	...
Sacramento MUD	96,665	7,224	3,556	541	2,118	...	2,325	9,534	2,633
San Diego G&E	154,035	16,500	3,025	2,405	4,875	505	137	15,600	7,750
Southern Calif. Edison	1,036,403	132,200	12,350	3,900	8,965	...	...	140,300**	...
COLORADO									
Colorado Central Power	14,996	400	400	83	150	...	...	400	...
Fort Collins L&P Dept.	5,012	500	450	150	250	850	300	600	600
Frontier Power	2,826	229	70	82	56	...	10	90	186
Home L&P, Greeley	7,795	...	...	...	...	...	...	...	...
PS of Colorado	232,967	5,043	1,799	314	3,246	11,293	504	4,945	1,891
Southern Colorado Power	32,018	1,900	650	273	690	700	200	1,400	900
HAWAII									
Hawaii Elec.	73,114	70,000	33,000	25,000	6,000	...	...	10,000	45,000
Hilo Electric Light	5,798	560	480	300	400	...	...	275	300
Lahaina L&P	1,343	...	...	...	...	...	...	...	...
Maui Elec.	8,587	426	272	259	404	...	14	236	126
IDAHO									
Idaho Power	75,035	7,000	7,500	7,150	2,500	2,500	500	4,200	605
MONTANA									
Montana Power	113,234	7,000	5,200	1,800	3,300	5,000	125	6,000	6,000
NEVADA									
Elko-Lamoille Power	1,831	...	...	...	...	...	...	...	...
Ely L&P	1,636	...	...	...	...	...	...	...	...
Sierra Pacific Power	25,801	2,454	1,137	817	401	...	74††	...	...
Southern Nevada Power	18,707	2,273	1,695	...	214	...	120	2,106	380
NEW MEXICO									
PS of N. M.	65,163	5,820	1,857	304	1,330	...	...	5,908**	...
Raton PS	2,341	...	...					...	...
OREGON									
Calif. Oregon Power	67,062	4,239	2,500	1,302	2,833	...	...	2,493	980
Central Lincoln PUD	8,666	...	...	...	...	...	...	...	...
Eugene Water & Elec. Bd.	19,669	...	...	...	...	...	...	...	...
Lane County Elec. Co-op.	3,686	4,060	2,697	2,735	1,282	...	85	947	2,715
Pacific P&L	196,144	17,188	19,776	9,948	8,329	...	442	24,157	8,106
Portland GE	198,556	9,000	11,600	6,250	5,000	...	65	15,000	2,750
TEXAS									
El Paso Elec.	62,019	7,307	2,312	1,700	1,358	...	1,529	...	...
Southwestern PS	123,204	9,610	3,338	277	5,353	...	1,230	13,031	3,275
UTAH									
Helper L&P Dept.	800	...	...	...	...	...	...	...	...
Provo Dept. of Utilities	7,520	529	368	99	170	...	257	594	233
Southern Utah Power	3,722	...	...	...	...	...	...	...	...
Telluride Power	7,518	218	357	309	149	...	...	222	...
Uintah L&P	1,084	...	...	...	...	...	...	...	...
Utah P&L	168,536	9,984	9,400	3,732	3,703	...	4,072‡‡	9,010	5,554
WASHINGTON									
Chelan County PUD No. 1	7,045	679	715	688	329	...	7	649	250
Clark County PUD No. 1	16,393	1,000	1,500	1,200	600	...	20	1,500	100
Cowlitz County PUD No. 1	17,130	1,100	1,500	1,400	400	...	1	1,500	400
Franklin County PUD No. 1	5,137	...	...	...	...	...	...	...	...
Grant County PUD No. 2	4,870	...	...	...	...	...	...	...	...
Grays Harbor County PUD No. 1	16,623	...	...	...	...	...	...	...	...
Lewis County PUD No. 1	10,373	...	...	...	...	...	...	...	...
Mason County PUD No. 3	4,927	...	...	...	...	...	...	...	...
Puget Sound P&L	159,228	...	...	...	...	...	...	...	...
Seattle Lighting Dept.	190,221	...	9,000	9,000	...	...	...	...	...
Snohomish County PUD No. 1	44,196	3,000	3,000	3,000	500	...	10	1,500	500
Tacoma Dept. of PU	51,398	4,560	5,800	2,250	1,200	...	...	2,800	1,050
Washington Water Power	93,906	9,105	9,543	6,670	3,710	...	456	7,806	4,415
WYOMING									
Cheyenne LF&P									
Rawlins Elec.	2,700	50	150	20	30	...	4	150	10
Western PS	4,493	360	280	17	150	...	6	210	150

* Automatic storage.

** Includes automatic and conventional.

† Fans

†† 141½ hp.

there is some overlap also in the residential urban from what it terms urban and fringe.

Utah P&L and its subsidiary, Western Colorado Power, combine residential and farm customers. The figures given include the two companies.

In reporting appliance sales, eight utilities used both dealer reports and estimates. These included California Oregon Power, California-Pacific Utilities (refrigerators, ranges, water heaters, freezers from dealer reports); Frontier Power; Idaho Power (small portion estimated; mostly from distributor reports); Southern Colorado Power; Southern Nevada Power; Salt River Project (small appliances estimated); Western Public Service.

Salt River says it plans an extensive program of dealer assistance in 1955. California-Pacific reported the following decreases in 1954 from 1953 sales: refrigerators, .5%; ranges, 3.8%; water heaters, 7.4%. It had increased sales of freezers (up 9.3% from 1953) and dryers (up 17%). Appliance manufacturers and distributors plan extensive training and sales programs in 1955 that should help dealers improve sales promotion methods, it states.

Hawaiian Electric merchandises through Hawaiian Electric Supply Co.,

Appliance Sales

Ironers	Dryers	Vacuum Cleaners	Dishwashers	Waste Disposers	Radio	Television	Utility Merchandises Yes	Utility Merchandises No	Appliance Sales Estimated	Appliance Sales Dealer Reports	
											ALASKA
1	4	8	1	2	...	...	X			X	Alaska EL&P
...	...	...	...	...	...	...		X			Ketchikan PU
											ARIZONA
359	620	...	630	638	11,577	17,074		X		X	Arizona PS
75	160	300	200	400	700	1,400		X	X		Salt River Power Dist.
100	150	...	175	75	2,000	5,000		X		X	Tucson GL&P
											BRITISH COLUMBIA
295	1,540	12,055	370	128	23,384	49,000		X		X	B. C. Elec., Vancouver
43	198	2,008	36	14	3,062	8,567		X		X	B. C. Elec., Victoria
...	...	...	...	...	...	...		X			B. C. Power Com., Victoria
											CALIFORNIA
65	90	200	100	15	260	350		X	X		Alameda PU Dept.
15	125	100	30	200	225	1,200		X	X		Burbank PS Dept.
56	162	...	...	...	...	...	X			X	Calif. Elec. Power
500	467	3,200	225	180	...	...		X			Calif.-Pacific Utilities
...	...	...	...	...	...	...		X			Glendale PS Dept.
50	60	...	...	...	...	...		X	X		Imperial Irrig. Dist.
...	...	...	...	...	...	64,000		X	X		Los Angeles Dept. of W&P
...	...	...	...	...	...	...		X			Modesto Irrig. Dist.
4,284	18,957	...	6,403	6,596	81,275	154,006		X		X	PG and E
...	...	...	...	...	...	...		X			Palo Alto
...	...	...	...	...	...	...		X			Pasadena L&P Dept.
...	...	...	...	...	...	...		X			Riverside PU Dept.
635	4,115	3,023	1,332	1,299	8,261	22,650		X		X	Sacramento PU Dept.
1,470	2,460	17,475	960	7,700	35,000	46,175		X		X	San Diego G&E
6,780	12,595	25,400	10,600	15,855	42,300	52,850		X	X		Southern Calif. Edison
											COLORADO
...	200	...	...	...	...	...		X	X		Colorado Central Power
200	300	1,000	300	200	1,400	1,000		X	X		Fort Collins L&P Dept.
20	18	100	14	20	300	469		X			Frontier Power
...	...	...	...	...	...	...		X			Home L&P, Greeley
602	1,279	...	555	1,172	...	...	X			X	PS of Colorado
125	250	1,200	125	2,300	2,800	8,000	X				Southern Colorado Power
											HAWAII
...	1,500	...	1,500	2,500	80,000	60,000	X		X		Hawaiian Elec.
30	50	...	50	20	...	...		X	X		Hilo Elec. Light
...	...	...	...	...	...	...		X			Lahaina L&P
5	14	39	31	12	165	450	X			X	Maui Elec.
											IDAHO
323	2,521	1,750	892	475	8,874	14,980	X				Idaho Power
											MONTANA
1,200	4,500	1,000	1,000	1,000	...	7,500		X	X		Montana Power
											NEVADA
...	...	...	...	...	...	...		X			Elko-Lamoille Power
...	...	...	...	...	...	...		X			Ely L&P
...	...	...	...	...	...	...		X		X	Sierra Pacific Power
101	181	687	98	285	...	526	X				Southern Nevada Power
											NEW MEXICO
415	223	...	265	129	...	9,790		X		X	PS of N. M.
...	...	...	...	...	...	...		X			Raton PS
											OREGON
225	1,739	...	184	173	...	8,143		X			Calif. Oregon Power
...	...	...	...	...	...	...		X			Central Lincoln PUD
...	...	...	...	...	...	...		X			Eugene Water & Elec. Bd.
...	700	2,888	112	18	...	468		X			Lane County Elec. Co-op.
1,533	15,692	...	1,648	595	37,338	39,764		X		X	Pacific P&L
900	10,000	10,000	750	200	13,000	19,500		X	X		Portland GE
											TEXAS
...	496	...	410	...	...	16,732	X			X	El Paso Elec.
731	2,876	...	1,059	...	...	23,378		X		X	Southwestern PS
											UTAH
...	...	...	...	...	...	...		X			Helper L&P Dept.
79	216	...	48	56	698	1,190		X		X	Provo Dept. of Utilities
...	...	...	...	...	...	...		X			Southern Utah Power
...	52	...	...	...	...	...		X		X	Telluride Power
...	...	...	...	...	...	...		X			Uintah P&L
1,475	3,490	10,639	718	713	14,861	22,086		X		X	Utah P&L
											WASHINGTON
23	296	330	87	52	867	908		X		X	Chelan County PUD No. 1
100	1,500	750	350	100	400	2,000		X	X		Clark County PUD No. 1
50	1,450	500	20	20	2,150	5,000		X		X	Cowlitz County PUD No. 1
...	...	...	...	...	...	...		X			Franklin County PUD No. 1
...	...	...	...	...	...	...		X			Grant County PUD No. 2
...	...	...	...	...	...	...		X			Grays Harbor County PUD No. 1
...	...	...	...	...	...	...	X				Lewis County PUD No. 1
...	...	...	...	...	...	...		X			Mason County PUD No. 3
...	...	...	...	...	...	...		X			Puget Sound P&L
...	...	...	...	...	...	...		X	X		Seattle Lighting Dept.
200	1,000	2,500	1,000	500	3,000	4,000		X	X		Snohomish County PUD No. 1
...	3,500	...	...	...	...	...		X		X	Tacoma Dept. of PU
693	5,833	8,400	1,190	510	12,182	21,509		X		X	Washington Water Power
											WYOMING
											Cheyenne L&P
15	100	15	15	35	...	...	X		X		Rawlins Elec.
22	157	160	30	25	460	1,180	X				Western PS

‡ Includes 360 central units.

‡‡ 649 compressor, 3,423 evaporator type.

a division of Heco, which covers wholesaling and retailing. It states that it has no central organization to which dealers report sales and that figures on appliance sales are rough estimates.

California Electric Power says its appliance figures include direct company sales. Imperial Irrigation District explains that dealer reports reflect only sales in Imperial Valley and that estimates are used elsewhere on the system.

L. A. Department of Water & Power reports that it depends on national figures in estimating sales of appliances, which means a time lag. The merchandising picture in the area has undergone such a drastic change that new methods of obtaining appliance sales figures are necessary, the utility says, and it is now developing ways and means, with local distributors, to utilize their figures.

Figures given by Pacific Power & Light exclude its newly acquired Wyoming division, where it has not yet instituted an appliance sales reporting program.

Provo Electric Power says it feels that appliance sales figures are better than 95% accurate, since it has double checked outside sales coming into the area on two occasions.

In addition to the sales given in the table, Clark County PUD reported 5,000 kw in space heaters. Cowlitz County PUD added 1,111 residential electric heating installations during 1954.

Idaho Power merchandises on a limited basis only.

Palo Alto said that over half of the new houses in the area are being wired for ranges. Los Angeles Department said 1955 sales promotion activities will be directed largely to improved wiring standards in new homes. PGE will continue emphasis on adequate wiring financing and appliance sales promotion. Public Service of N. M. will promote electric ranges in the spring, freezers in the fall. Chelan PUD will continue its two- to three-wire conversion program, which 100 customers accepted in 1954. Seattle City Light is continuing its modernization promotion directed at replacement of flame-type cooking and water heating equipment.

Benton-Lincoln Electric Co-op reports that it hopes to make an appliance survey in 1955.

Franklin County PUD states that, with 50,000 acres of new land near Pasco scheduled to receive irrigation water in 1955, new farms, population and income will be created. Saturation of ranges and refrigerators is exceptionally high, indicating a good replacement market; that of room air conditioners is low; food freezers probably are near the national saturation figure, it says.

Hilo Electric points out that, with expansion of its lines to rural areas, it has power available to all types of customers — some of them previously deprived of living electrically. Its business building activity in 1955 will be in cooperation with the program of the PCEA Electrical Living Committee. The company program includes advertising and promotional allowances to distributors on approved appliances.

L. A. League Elects

A record year of achievement was reported at the annual banquet and installation of officers of the Los Angeles Electric League. Elwood Reeves, Los Angeles division manager of Magnavox Co., succeeded Robert Williams, Brand Appliances, as president. Featured speakers at the event, which brought close to 300 key television and appliance merchandisers together, included George Putnam, KTTV news commentator, and Dick Lane, KTLA sports personality.

A review of the work done by the league for the industry in 1954 was presented, showing the organization has held 66 meetings for a total attendance of 1,561; now has a membership of 401; its major activities included estimating classes for the electrical contractors division, reports on TV sales, hi-fidelity division meetings, coordination of color TV, small claims court service, air conditioning group meetings and activities, housewares activities, TV interference coordination, home lighting meetings, group insurance, publicity, legal counsel, and many personal activities on behalf of dealers and distributors.

Other officers elected were Ray King, King's Appliance Center, executive vice-president; W. Floyd Loveland, Department of Water & Power, secretary; Leo K. Allen, Barker-Allen Electric Co., treasurer; and a board of directors that represents all branches of the industry.

Benjamin Franklin stepped out of a Saturday Evening Post cover to judge which appliance was the most useful, when Frigidaire presented its 1955 line in a colorful road show that was professional from start to finish. Taken at the Oakland, Calif., performance, these pictures show Crew Leader Dan Bowell, Frigidaire, with a mock-up of the built-in range to be available soon and the de luxe refrigerator, featuring a "picture window" vegetable hydrator in the door. The pitch included the complete new line of Frigidaire appliances. Service was dubbed "the key that lets you in to the place where sales begin" and a humorous skit was built around the trade-in problem. Which appliance was judged the most useful by Ben Franklin? You guessed it. All of them!

ELECTRICAL WEST Sales Guide

News Letter

March 1955

FOR THE ELECTRICAL MERCHANT OF THE WEST

Jud Sayre, merchandising strategist who pioneered the automatic washer until it obsoleted all others and who is putting on a Norge revival that is equally sensational, keynoted the compact dinner conference San Diego's Bureau of Home Appliances assembled, 450 strong, Feb. 16. He stirred up the winter-sluggish blood of salesmanship to spring tempo, then hopped to Los Angeles and San Francisco where he did the same to the Norge distributor forces. In a press conference he hinted at some product surprises soon.

Trail brazer

Edward F. Lethen Jr. of CBS-Columbia took the same conference back stage with a movie of colorcasting. EC&M magazine presented an award to contractor Jerry Burt and wife for a prize home lighting job. The local players kidded the life of "Discounts Unlimited"--a short and none too merry one. And the S. D. Chamber of Commerce unveiled a plan to bring an annual festival to town. Both local TV stations announced increased wattage and colorcast facilities. See story next issue.

... and companions

Late confirmations delayed announcement of the program for Intermountain Electric Assn.'s annual conference at Ogden March 11. One speaker scheduled was Charles Long, Westinghouse Lamp Division, San Francisco.

Delayed

A Spring Clinic sponsored by San Diego Bureau of Home Appliances will start April 5 and run for three weeks, with Tuesday and Thursday breakfast sessions, 7:30 to 9 a.m. Salesmen attending will get intensive training in selling appliances as gifts for Mother's Day, June brides, graduation. Twelve manufacturers will take part. Those wishing to take the course must make reservations. . . All types of equipment and service allied with the industry will be shown at the bureau's Spring Fair, which opens April 22 for one week--conventional appliances, lighting, wiring, hi-fi, hobby tools, kitchens and built-in features designed to accent use of appliances.

Spring clinic

Dates for the Western Summer Market in San Francisco's Merchandise Mart are July 18-22. The gift and housewares show will be held Aug. 4-7. . Los Angeles Trade Fair, a CofC subsidiary, has scheduled its Lamp and Picture show for July 10-14.

Summer shows

To help push the May Days Are Fan Days compaign, NEMA's electric fan section is distributing a retailer's plan book, "Early Season Fan Selling Pays Off." The section again offers $3,000 in savings bonds for prize-winning May window displays featuring fans; will furnish the streamer required for participation.

May's for fans

Pegged for the rainy season, Arizona tie-in with the Wife Saver dryer campaign hit the jackpot--started right after one of the worst storms in years. Dealers, distributors and utilities participated. The Arizona Republic and Phoenix Gazette sponsored a Happy Homemaker contest, with dryers awarded for the 12 best 25-word essays completing the sentence: "A clothes dryer in my home would mean--" Contest blanks were secured through 350 participating dealers. The Appliance Merchandisers Assn. offered its dealers and their salesmen $1 for the first dryer sold; $2 for the second; up to $10 for each one over nine.

Weather ties in

Built around EEI's White Glove promotion, an April electric range campaign will be sponsored by PG and E in areas where it serves electricity only. El Paso Electric reports that it will combine the White Glove and It's Tops (electric water heater) campaigns in a "3 for 2" promotion in March, April and May.

White gloves are clean

Gas too--A free trip around the world and other prizes are offered in what the northern California association describes as the "largest gas range promotion ever undertaken by the industry." Promotion cost will be in excess of $100,000, according to announcements.

In the act

Gross of more than $33,000 was reported by Home Appliance & Electric Co. of Eugene, Ore., during a Friday through Sunday appliance sale. Teasers well advertised in advance were a stunt in which a 1947 penny was worth from $10 to $200 and a "2 for 1" offer on some washer and dryer sets and on any range and refrigerator combination carried. The store sold 52 washer and dryer pairs, 43 TV sets, 14 ranges and 7 refrigerators; cleaned out its small appliance stock. No trade-ins were accepted; all purchases were by cash or at regular credit terms.

2-for-1 sale

TAMA (Tucson Appliance Merchandisers Assn.) is now a legally incorporated organization. It was to move about March 1 to a new office at 426 E. Seventh St., where it will have larger quarters, space for small meetings.

It's official

A new corporation will be formed by Hawaiian Electric Co. to take over merchandising functions now handled by Hawaiian Electric Supply Co. The change to a self-managed, self-supporting organization is expected to still protests of independent dealers and take their support from a legislative bill to prohibit public utilities from wholesaling and retailing merchandise. W. L. Nylen Jr., spokesman for a group of dealers objecting to similarity in name of utility and merchandising department and location of some department operations in HECO's main office building, is quoted in the Honolulu press as saying that a completely separate corporation is "exactly all we wanted and we'll be completely happy about it."

Ends dispute

More than 2,500 dealer authorizations have been signed and accepted since Sues, Young & Brown instituted its fair trade program last October, Charles P. Culbert, vice-president in charge of sales, reports. Last month the distributor wound up a series of 13 open house Trade Fairs for Fair-Trade Dealers in southern California. More than 350 electric appliance dealers attended the initial two-day showing in SYB's Los Angeles headquarters.

Trade Fairs for fair-traders

An 11-point TV servicing code for San Francisco was adopted by 45 service companies at a February meeting called by the Better Business Bureau; was to be submitted to the entire industry early in March. Among the provisions are: advertised price should not be so high as to require the servicer to sell unnecessary parts or to take the chassis to

TV service code

the shop; accurate estimates should be made; a 30-day warranty offered; method of payment decided before the work begins; charges itemized. An industry committee will handle administration and enforcement.

Anti-discount bill

As interpreted by many California dealers, State Assembly Bill No. 22 regulating discount and cost-plus sales would have its main effect on advertising methods. Under its provisions it is unlawful for any merchant to sell, offer for sale or advertise for sale merchandise or service at a discount other than a discount from the established price in the trade area (both established price and price to the purchaser must be clearly stated) or on a cost-plus basis unless the cost is clearly stated. As defined cost includes invoice cost, less any trade discount taken by the merchant, plus the cost or pro rata cost of transportation actually paid by the merchant; excludes all overhead, cost of doing business, promotion and advertising. A final clause states that the provisions apply to sale of merchandise to any special group in the same manner as they apply to the public. Although a strong lobby is opposing the bill, many independent dealers are in favor of it.

Dealer licensing

The Dealer Licensing Bill before the California Legislature (Assembly Bill 2190) would regulate installation, servicing and repair of domestic appliances; create the Domestic Appliance Contractor's Licensing Board. Sponsors say it provides a one-point responsibility to fill the gap between utility outlet and appliance, thus acts as a shield to protect the buyer-user's health, safety and pocketbook against inefficiency and malpractice. Many in the industry, however, believe that provisions are too broad; think that the bill should have been written to correspond more nearly to a similar Colorado law, with such simple provisions as excluding the delivery and plugging-in of refrigerators.

New products

Among new products: An instant coffee and tea maker and a blender attachment for its No. 10 Mixmaster are offered by Sunbeam. . . An Emerson home air conditioning unit that can be wheeled from room to room comes in models ranging from 1/3 to 3/4 hp. . . A 2-qt electric sauce pan and double boiler has been added to Nesco's Cookryte line. . . Servel has shortened its line of automatic water heaters; is offering five electric models this year as compared with 17 last year. . . Easy has broadened its line with introduction of its first medium-priced automatic washer, a top-loading machine. . . Philco built-in range components will be available this quarter; its 1955 refrigerator line includes two two-way opening door models; chest-type freezers feature a convertible compartment that will fast freeze, refrigerate or store frozen food.

Distributor news

Don Anderson Inc., Fresno, will handle the Thor line in 11 central California counties. . . Larry Costa is now manager of the radio and TV service department of Boyd Distributing Co. at Denver, replacing Cy Krisher, who has gone with Admiral. . . Maytag West Coast Co., northern California distributor, has named T. R. Pierce representative in the San Jose and San Francisco peninsula areas, succeeding Norman Bonis, now a partner in the Salinas Valley Appliance Co. Keith A. Williams will cover California north of San Francisco; K. J. Kirkpatrick, western Nevada. . . Alex Miller, former sales manager for Savage & Son, appliance distributor, is now sales manager for Manitowoc and Hoffman products handled by Independent Distributors, Denver. . . Morrison Supply is handling A. O. Smith Permaglas water heater distribution in San Diego, with Norman Anderson continuing as local representative. . . Western Empire Distributors, Fresno, San Francisco and Sacramento, has given up its Sylvania distributorship effective Feb. 28, President Don F. Courtleigh reports.

Incentives and promotions

A Dealer Inventory Protection Plan for room air conditioners announced by Westinghouse provides payment as high as $250 for each new 1955 unit in dealer stocks as of Sept. 15. Earlier a price protection policy on these units was provided. . . A Trade for Traffic promotion set up by Carrier Corp. is designed to help dealers sell new air conditioners early in the season by offering a trade-in deal. The used air conditioners will be advertised at "bargain-counter" prices when midseason competition gets tough.

About manufacturers

Realigning its sales organization into five instead of two geographical divisions, Norge made Los Angeles headquarters for its Western unit with R. H. Pizor in charge. . . Youngstown Kitchens has a new distributor in Honolulu, Service Motor Co., Pete Fukunaga, president. . . Allied Radio & Television, San Jose, heretofore exclusively a retail and service business, will manufacture a line of special TV cabinets and a number of electronic items. . . Kaye-Halbert is making available a custom TV chassis kit for do-it-yourself fans. Suspended for a year, Kaye-Halbert's San Diego factory branch has been reopened at 3885 Pacific Coast Blvd. . . Dorn's House of Miracles has opened two more neighborhood stores, one in Los Angeles, the other in Pomona, Calif. . . Du-Wal Inc. has named Charles I. Perry Jr. of Los Altos to represent its line of automatic electric cooking equipment in northern California and Nevada.

About people

To spark its 1955 Operation Livewire campaign, Puget Sound P&L has appointed sales supervisors in each division. William Corcoran will take the central division, Orland Hunt, southern, Ralph Conner, northern, Wilbur Farsie, western. . . Phil Battelle, publisher of Western Appliances and Television has announced his retirement; sale of the publication to Frederic M. Rea, former Sunset editor and head of Western Business Publications. . . Max J. Awisus has been made Westinghouse portable appliance salesman in San Francisco. . . Expanding its refrigeration specialties department, Westinghouse named four new Western district managers--Paul R. Miller and Leo Rubin, room air conditioners, water coolers and dehumidifiers; Arthur H. Palisoul and J. H. Eagan, beverage coolers. . . Mrs. Charlotte S. De Armond has been given the newly created post of public relations director for Hoffman Electronics Corp. . Ben Rogers is now San Diego representative of Radio TV Supply, Deepfreeze and Stromberg-Carlson distributors. . . Rex Langdon has been added to the staff of Nicolin Distributing Co., San Diego, Thor and CBS-Columbia rep. . . Joe Martino, Martino's Furniture Stores, San Jose, is president of the Santa Clara County, Calif., Gas & Electric Appliance Dealers Assn., succeeding Al Smith, L. Lions & Sons.

Moves and changes

In Honolulu National Electric Supply has moved to new quarters at 611 Keeaumoku St. . . After 23 years F. B. Connelly Co. of Oregon has dropped most of its housewares business to devote full time to major electric appliances and radios. H. T. Ward continues in charge of Norge, Ironrite and KitchenAid appliances; Loran Sage will be in charge of Sylvania radios and TV, Sunbeam appliances, G-E vacuum cleaners and other items. The action does not affect the Seattle house. . . Hoffman Electronics is operating its own sales organization in Sacramento and Fresno, Calif. At Fresno it has purchased Kinney & Faust. Wendell and Roland Kinney have retired; Edward Faust will remain as Hoffman gm. In Sacramento it has acquired the E. M. Kemp Co. . . Magic Chef is quitting the room air conditioning business; will offer six electric range models this year in addition to its gas line. . . Acme Industries of Southern California has been formed by Charles C. Porter and John B. Macomber; will handle engineering and sales of Acme air conditioning and refrigeration equipment from offices at 5205 Hollywood Blvd., Los Angeles. . Admiral says it will set up a built-in range and oven division.

Dreiman Corlett Doub

PCEA Readies Again To Develop Business

After waiting for years for the go signal, the green light was flashed on unmistakably at the Business Development Section conference of Pacific Coast Electrical Assn. in Fresno Jan. 27 and 28. It was a return to the working interchange of ideas session after two years of taking a show on the road to stimulate and keep alive commercial interest in the electrical industry.

While the road-show meetings may be conducted again in the future, Jack Corlett, General Electric Co., San Francisco, section chairman, said the guidance committee felt the time had come for sales promotion. Hence the meeting was devoted, he said, to exploring ideas and methods possible, to enunciate involved problems and recommend study of them to committees and to spell out promotional programs that can be sponsored or endorsed in various parts of the PCEA area.

Roy Dreiman, PG and E, San Francisco, president of PCEA, spelled out utility management's concern for renewed commercial activity by showing that greatly increased capacity has been installed. Likewise, other industry competition for the dollar is becoming exceedingly aggressive. However, in many lines appliance sales have dropped and 1955, he warned, may be handicapped by tighter credit, heavy taxation, a decline in new plant expansion and threats of strikes.

The conference was welcomed by Arthur Church, manager of the San Joaquin Division.

Two luncheons brought the entire group of more than 300 registered together again, although most of the conference was devoted to parallel sessions of the residential committees, room cooler and heat pump committee, agricultural load building committee and industrial and commercial committees.

Harry B. Price Jr., Norfolk, Va., dealer, eloquent president of National Appliance & Radio-TV Dealers Assn., addressed the initial luncheon. The significant things picked from Price's stirring, enthusiastic and well received message included:

Speaking of NARDA, he said the most important effort is local and where there are strong dealer groups NARDA has no desire to move in. He then told of many national services NARDA performs for dealer members.

Of the utilities' relationship to dealers, he said it was important to realize there are three types of dealers and utility promotional programs should be so designed that they fit the needs of these groups. First is the specialty dealer who has to depend on high-cost selling effort to cover his costs and hence will advertise and provide salesmen. The second group is of the small "mama and papa" stores who cannot afford tie-in advertising but are an important factor in selling and need a special program tailored to their business. The third comprises the large merchandisers, to whom appliances are but one of many lines carried. These usually have their own merchandising program and are only receptive to an industry promotional one that fits into such a pattern.

Price urged dealers to be ready to plow back their profits in order to develop the market for the new things. He urged selection, supervision and training of salesmen and urged assistance of the industry to make the atmosphere for salesmen more attractive than it has been in the recent past. That two in every seven people are going to buy a major appliance, that they are people and must be treated as such and their needs served were strong points that he emphasized. He sailed boldly into the discount problem, saying he thought it had passed its zenith. He maintained that it was far larger than a mere sales problem in that it attacked the integrity of the American business way of life itself and threatened a return to discredited European and Asiatic trading.

Saying that every kitchen in America has been outmoded by the new designs, color and built-ins, he followed with a strong admonition that dealers go after such a market even if they cannot touch the mass builder market.

O. R. Doerr, PG and E vice-president and chairman of the commercial division, EEI, this year, brought a preview of a presentation soon to be made available to other large groups. It was prepared, he said, by EEI, NECA, NEMA and NAED, making use of the Westinghouse three section large screen and three projector technique to tell a story of the industry's interdependence. Acting as moderator himself, he introduced W. P. Creech, Westinghouse Appliance Division of Mansfield, who predicted a 428,000,000-appliance market in the next five years. This he based on trends in more people, more families, people on the move, more money, more new homes, more appliances in the existing homes and more generating capacity by the utilities to serve all.

Kurt Steindorff, General Electric Co., San Francisco, was next called

Adams Doerr

Price Corlett

upon to interpret for the other branches of the industry what this 428,000,000 appliances would mean in new generating plants, transmission lines, substations, switchgear and distribution facilities. It was the first time such a direct translation had ever been made of the worth of appliance business to the manufacturing and supplying end of the industry. It totaled to a $321,000,000 business.

Then Matt Sherwood, field director, National Electrical Contractors Assn., San Francisco, showed what must be done in the way of wiring in order to permit the public to make use of the 428,000,000 appliances. He pointed out that 90% of the 43,000,000 wired dwelling units in the United States are inadequately wired and a great proportion of them obsolete electrically. To bring them up would mean a $3½ billion electrical material market. Doerr concluded by announcing the PG and E's development of a financing program by more than 500 banks on terms almost identical to FHA. He concluded by showing that the automobile industry takes $253 per family per year, the liquor industry $200 a year and that the taxes on liquor alone are more than the electrical industry gets from all the electricity used in the country.

Room Cooler and Heat Pump

C. V. Soper, Chairman
N. W. Clingman, Vice-chairman

Fifty dealers, manufacturers and utility men jammed the small meeting room to discuss heat pump applications, costs, installation and room cooler potentialities. Initial cost and installation cost of heat pumps, including duct work, called for considerable discussion, led by Carl La Gasse of Westinghouse and Hiram Andrade of G-E. John Lamborn of Valley Electric Supply Co. and John Schlemmer of General Air Conditioning, Oakland, brought out that original jobs as planned by builders or designers were seldom adequate for full air conditioning and have to be refigured and additional costs added to cover proper duct work.

Various types of heat pumps and their application to specific territories were responsible for the general feeling that some types are best suited only to particular locations to get 100% efficiency, they said. Service is a most important factor for a dealer to consider and he should set aside a reserve to take care of it. Good service policy and instruction to the customer on the operation of the equipment can cut down service costs.

Operating costs data brought out that 3- and 5-hp units seem to average about the same number of kilowatt-hours per year in the Western states. In uninsulated homes of approximately 1,200 sq ft the cost can run into a total of 33,000 kwh per year. With good insulation this can be reduced as much as to 8,375 total kwh. About 4% of the kwh are used by strip heaters in the units for defrosting.

Newer, smaller units, more efficient heat pumps are being promised by the manufacturers to do the entire heating job without resistance heaters. The trend among architects and builders is to the packaged job. More education among architects and builders and financial houses was indicated and utilities asked to sponsor such meetings with the help of manufacturers' men. In the past the heat pump has been considered as belonging in the de luxe class home but in 1955-56 it is expected it will move into the mass market and tract homes.

Of room coolers, Paul Miller, Westinghouse, said a survey of motel owners using only evaporative coolers showed 90% ready to switch to refrigerative type. Most coolers now made need supplemental heating where temperatures drop below 60-65° outside. The ½-hp and 1/3-hp units are fast being discontinued as ¾-, 1-, 1½- and 2-hp units are needed to do the job. Dealers should sell a wiring job with the unit in order to guarantee customer satisfaction.

Residential Committees

E. W. Meise, Presiding

Home Lighting Committee

A. A. Reitman, Chairman
Guy de Leuze, Vice-chairman

Model homes in builder tracts played an important part in all phases of the residential committees' consideration. For home lighting, N. Tallon and R. Smith of Southern California Edison described the success had in model homes in the Brookhurst Park tract where "electric award" homes

Dickey Bronson Mullenbach Stetson

were publicized and resulted in raising the level of lighting and wiring for other tracts in the whole area.

R. H. Robison, PG and E, Oakland, discussed the need for training of retail salespeople to sell floor and table lamps and home lighting equipment. Max Rosen, Incandescent Supply Co., Los Angeles, pointed up the profit possibilities in the refixturing market by emphasis on the quality lines. C. T. Brauer, Anglo California National Bank of Fresno, described the improvement loans available for remodeling, adding on, or erecting certain types of new construction that would cover rewiring and refixturing. While the improvement loans have been available for wiring alone, they are now available from the banks to include major appliances on the same contract.

Meise Dent

Soper Sullivan

Residential Adequate Wiring

E. W. Meise, Chairman
W. H. Abraham, Vice-chairman

Financing of adequate wiring came up again in the residential AW committee. Meise told of the contractors' division of San Diego's Bureau of Home Appliances and its success in developing much increased adequacy in the homes built in this area. L. G. Maechtlen, Square D Co., and John Sullivan, Sequoia Savings & Loan Assn., discussed the financing plans available under terms similar to FHA and VA. A. M. McMillan, Harvey Hubbell Inc., pointed the need to acquainting appraisers with the difference in standards of quality of materials and thus getting their acceptance to financing better quality as well as adequacy. W. R. Rivers, G-E, spoke of available lists of architects and builders to contact in an endeavor to raise their sights. L. W. Bjerrum, Southern California Edison salesman, once a contractor himself, pointed out how the contractor is caught by the poor specifications architects and builders give him. These demand the code minimum. He also recommended working with the better contractors who would cooperate and help build standards rather than the lowest bidders.

Home Economics Committee

Christine Dent, Chairman
Ruth Kruger, Vice-chairman

Continued teacher education through workshops was advocated by Ruth Kruger, Arizona Public Service Co., in order to keep them acquainted with new equipment available from the manufacturers by replacement through their special plans. The matter of teacher credit for the workshop sessions was debated. Plans were announced for workshops for them to reach the rural teachers in Eureka, Salinas and in some other community in southern California this year, possibly south of Santa Ana. Dealer personnel workshops to train home economists and dealer salesmen will also be conducted. Last year more than 200 were trained in meetings in the State of California.

Thunen Schwartz Walsh

Commercial-Industrial Committees

D. V. Doub, Presiding

Commercial-Industrial Power Utilization

D. V. Doub, Chairman
W. F. Lambirth, Vice-chairman

After discussing quite thoroughly the possibilities of revising the former power handbook, preparing data sheets, amassing a bibliography of new uses and applications, making competitive power studies and considering standardization procedures such as for transformers, etc., this group decided to ask the PCEA to sponsor a power-heating conference possibly in April, May or June to which industrial leaders, engineers, etc., would be invited. It would be a one-day conference in the northern part of the state, another in the southern part, and might later be expanded to a bigger conference and show. It would be directed to top managements of industrial firms who can use power and heating in their processing.

Commercial-Industrial Lighting

Robert Thunen, Chairman
J. Roy Jones, Vice-chairman

Leonard Hobbs, member of the RLM Institute and the NEMA commercial-industrial lighting committees, presented the NEMA commercial and industrial relighting program and announced that the first Western city to use it will be San Diego. It is directed at the small store, office and plant market and operated through electrical contractors as the logical contact people. The program provides new selling tools, a simple sales training course, a new technical training course based on watts per square foot rather than illumination terminology, and an adequate advertising and promotion program.

Lighting Salesmen McMath and Barr of the Fresno PG and E put on a skit depicting the way the lighting

salesman for the utility can help contractors sell an improved lighting job. John Walsh, PG and E, San Francisco, reviewed the evolution of lighting systems from the bare incandescent lamps to the luminous ceiling, showing both the advantages and some of the difficulties with the new and promising method of illumination. He was followed by Robert Schwartz, Schwarz & Lindheim, electrical contractor of Oakland, with an excellent summary of the luminous ceiling situation. His paper will be published in full in the April issue.

Commercial-Industrial Wiring

Paul L. Mullenbach, Chairman
C. D. Bronson, Vice-chairman

Frank Dickey, Anaconda Wire & Cable Co., was asked to review that company's promotional programs, such as "Power Up" which had been stopped because of the national emergencies. This generated quite a discussion over the matter of acquainting all people in the industry with the programs and publications available that could help them to sell more wiring. Chairman Mullenbach felt that a PCEA folder, giving an index to all such material, would be of value. Others questioned whether it would be used or read. Prepared talks for people in the industry to give to public groups such as luncheon clubs, schools, etc., were recommended. The certified lighting program was felt to offer a medium for additional sales effort.

Working with the substantial businessmen in the contracting business was recommended by Bronson, who told of the NECA business development program. Mullenbach recommended the taking of new products as an "ice breaker" to industrial and commercial accounts to open the way for wiring and equipment modernization. All agreed that communication among various branches of the industry needed a great deal of improvement.

Agricultural Load Building

G. H. Sullivan, Chairman
D. F. Roach, Vice-chairman

Concern that a bill pending in the State of California Legislature might prove troublesome to the industry brought forth a recommendation of this committee to the board of directors that it be studied and its effects evaluated. The bill would require a water board set up, which in turn would issue permits for the drilling of any water wells in the state on the theory that the underground water is public water and needs to be regulated. Indeed the subject of water conservation loomed large in all the committee's considerations. The formation of water districts and its effect on electrical utility load was felt to be balanced by the over-all state need for water conservation in which the utilities should cooperate fully. The 4-H program was commended highly and details of it discussed.

Agricultural committeemen: standing, Lee Wilhite, Don Struck, Jim Lyon, E. H. Stewart, Thor Christensen, Jesse Porter; seated, Hartman, G. H. Sullivan and D. F. Roach

James Lyon, San Diego, showed a number of applications of electricity to the poultry industry, such as improved lighting of the poultry houses, storage battery operated trucks for poultry feeding and general use, electric humidifiers for egg storage rooms, incinerators for disposal of deceased birds, debeakers to reduce fighting and mortality and electric fly killers.

Thor Christensen, PG and E, again brought up water conservation in the discussion of overhead sprinkling and its advantages over ditch irrigation. Kinds of crops that have been successfully sprinkler irrigated were reviewed and evaporation losses discussed.

E. H. Stewart, Wesix Electric Heater Co., discussed the water heater potential in the dairy industry and improvements that could be made in the design and capacity.

Don W. Struck, San Diego Gas & Electric, showed how much labor could be saved on a farm through the use of automatic controls. Time controls can be applied to chicken lighting, feeding equipment, yard lighting, etc.; temperature controls to ventilation, frost protection, warming of drinking water, brooders, soil heating; pressure controls for house water systems, steam accumulators; humidity controls for egg-cooling rooms, etc. Various other controls can be used on farm equipment. This brought out the need for more adequate wiring on the farm, especially where simultaneous operations from automatic controls could impose a heavy surge on the system.

James Tavernetti, University of California, Davis, discussed the CREA programs and the projects now under study and investigation.

Flat Rate in Los Angeles

Flat rates on wiring and installation costs for electric ranges, water heaters and dryers will be tried for 90 days beginning March 15 in the Los Angeles area as a result of Los Angeles Electric League activity. The plan resulted from a meeting of utility representatives and major distributors, and will be the first time in six years that a coordinated sales campaign like this has been attempted. The plan will apply to normal installations, about 90% of the total. Customer forms will be devised by the league. A customer's consent to a wiring and installation price obtained on a form will solve the dealer's problem.

Co-chairmen of the coordinating committee were Frank Ballman, Thermador, Arthur McGettrick, Admiral. Utility representatives were Floyd Lovelace, Los Angeles Department of Water & Power, and J. C. Meserve, Southern California Edison Co. The distributors committee included E. M. Milakovich, Frigidaire; T. E. Wyatt, RCA; Frank Silver, Kelvinator; Phil Constance, Westinghouse; Don Piper, Sues, Young & Brown; and Bill Cook, Cook-Nichols. On the dealers committee were Ray King, King's Appliance; R. D. Williams, Brand Appliances; Andy Bourke, Sears; Cliff Swanson.

Doerr

Price

Optimism Is Keynote of San Francisco Market

Optimism for 1955 saleswise, tempered by a realization that competition would be tough, hard selling necessary, was expressed by industry speakers at the recent Winter Market in San Francisco's Merchandise Mart.

At the opening press luncheon Vale E. Freeland, Westinghouse Appliance Division, Mansfield, Ohio, predicted a 10% increase in major appliance sales in 1955, with greater percentages on some low-saturation lines.

Changes in merchandising operations to meet the changing picture will be needed, he said. He believes the local competitive problem can be licked by: (1) more attention to the manpower problem; (2) more emphasis on good creative selling; (3) developing a market for used appliances; (4) pushing the low-saturation appliances; (5) handling fewer lines; (6) stressing salesmanship and playing up store's services and installment selling on the same level as other merchandise.

There will be plenty of electric energy for all the appliances dealers can sell and there is no need to hold back, O. R. Doerr, vice-president in charge of sales, Pacific Gas and Electric Co., and chairman of the Western Radio-Television and Appliance Trade Dinner, told the large group that attended. With additions to generating facilities, there is ample capacity for years to come; the only ingredient needed is the ability to sell equipment to utilize it, he pointed out.

Looking for a favorable year in 1955, Doerr said one of the concerns is effectiveness of selling at the point of sale. Those responsible for getting the customer to purchase have not been functioning at maximum, he declared.

For those who want to work, there is a lot of profit along the way, Harry B. Price Jr., Norfolk, Va., appliance dealer

Top—Vale Freeland, Westinghouse Electric Appliance Division, Mansfield, and Nancy Johnson, regional home economist, show a model of the company's built-in range to Bob Long, manager of Tecco, San Mateo. 2—In Hotpoint booth, Clarence Ramer tells Ed Dysle, East Side Appliance, Santa Cruz, and Mrs Dysle how new refrigerator with stainless steel front can be recessed in wall. 3—Carl Savasta, Lavenson & Savasta, and Allen Corren, M. Corren & Sons, Stockton, look at new Thermador range with stainless steel top. 4—Latest model Gibson refrigerator is shown to M. L. Finnestead, Finnestead Washer Service, Sacramento, and Bill Ross, Ross & Hill, Stockton, by J. J. Lukanish

In the Crosley booth, Home Economist Phyllis Larsen pours coffee for Al Limberatos, Allied Radio, San Jose; W. L. Peterson, Allied Radio, San Jose; William E. Brooks, Napa Crosley-Bendix dealer;

Mike Russell, California Electric Supply Co. Right—Harold Beutel, Beutel Refrigeration, San Jose, is shown features of the Manitowoc refrigerator by Bob Chambers of McCormack & Co.

Frigidaire's new dishwasher is shown to Celeste Schwartz and Milton Schwartz of Casa Marin, San Rafael, by Betty Smith, home

economist. In the Meyberg booth, R. H. Martin shows the RCA Victor TV to Herb McClure, Woodlake Hardware & Furniture Co.

and president of the National Appliance and Radio-TV Dealers Assn., told the dinner group. Public confidence is at a new high and we could make 1955 the best year for the appliance industry, he added.

Turning to discount selling, he said that many discounters had found they had to give service and that dealers had found they had to give a better value. "We are offering the best values ever in this business," he said, "de luxe with benefits built in."

"Justify your existence or close up; operate at a profit or pass out of business," he emphasized. There is no substitute for integrity and it is necessary to have an established price, he stated. In his opinion list price is a loose term and the dealer who runs a business of integrity has to offer everyone merchandise at the same price. The public, he said, determines what it will pay.

Pointing out that we are in a dynamic economy and "you can't afford to be a reactionary," Price advised dealers not to resist the inevitable.

With colors, built-ins and other innovations, we have obsolescence and the next five years have no reason to be lean, he predicted. Profit possibilities will prove to have been small in the past five years as compared with the next five, he believes.

Built-ins have outmoded every kitchen in America with a single stroke and everyone is a good prospect, he pointed out. They have put the specialty back in specialty selling but they present a challenge also and dealers might well think discounters a sweet dream in comparison, he believes.

"Don't play color down because of the inventory problem," he advised, "don't buck it. Go out and preach color, get rid of hospital white." Trade-in is a part of the appliance business and money is to be made out of it, he reminded.

However, nothing was ever built without a plan, he declared, and the dealer must understand his capacity; pick out the name he is going to associate with his; concentrate on a growth item for 1955; avoid too ambitious a program; establish sales potential and reasonable percentage; set up sales quotas and establish budget; decide on how much to spend on advertising and promotion; determine how much sales power it will take to deliver the job he has decided to do.

In a talk entitled "You Make the Difference," William H. Gove, vice-president and director of sales, EMC Recordings Corp., St. Paul, Minn., gave these precepts: (1) be yourself—your best self; (2) be a good listener; (3) serve customers to death; (4) ask them to buy. If you find out what people want and make it easy for them to get it, you can't go far wrong, he declared.

Amplifying, he advised: "Listen with the heart and with understanding, take the attitude 'let's work it out together'; use the two words 'I suggest' in their many forms to ask the customer to buy."

A MESSAGE TO AMERICAN INDUSTRY • FOURTH OF A SPECIAL SERIES

FINANCIAL AID TO HIGHER EDUCATION

Our Colleges and Universities Are Living on Borrowed Time

. . . time borrowed from underpaid faculty members

The chart on this page tells a story of profound importance to every American. It is the story of the financial beating our college and university faculty members have been taking in the past 14 war and postwar years.

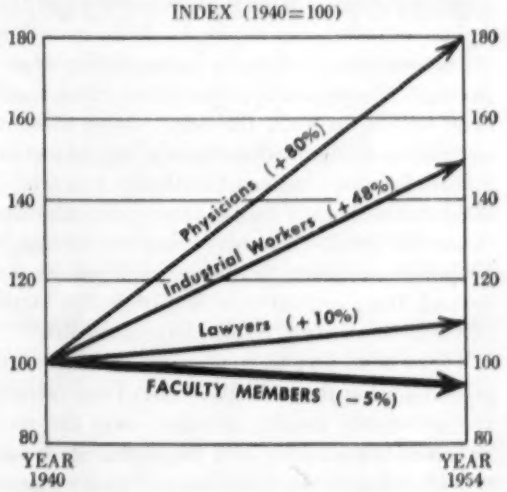
On the whole, this span of 14 years has been one of great and growing prosperity. But, as the chart shows, our college and university faculty members have, as a group, had less than no share in it.

During this period, from 1940 through 1954, the real income of the average industrial worker (that is, what his wages would purchase in goods and services) has increased by almost one-half. Among professional groups, physicians have enjoyed an increase of about 80 per cent in their real income. Lawyers, far less favored financially, have had an increase of about 10 per cent. But faculty members have not only had no increase at all; over these years of prosperity their average real income has fallen by 5 per cent. These figures do not take account of the increase in taxes since 1940.

Senior Teachers Hardest Hit

These figures are, of course, averages. For some groups of faculty members it has been better; for others worse. It has been particularly hard on senior faculty members. Between 1941 and 1953 their salaries lost about 8 per cent of their purchasing power. Being deeply committed to their careers they could not respond to alternative employment opportunities as readily as could their junior colleagues. For junior faculty members there was some increase in real income between 1941 and 1953 but only about half as much as the average for the nation.

What's Happened to College Faculty Salaries*



* Real Income before Taxes.

Source: Council for Financial Aid to Education; U. S. Dep't of Commerce; U. S. Dep't of Labor.

Public Colleges Fare Better

There are also marked differences in the average financial reward received by faculty members in different types of colleges and universities. A recent study by the Council for Financial Aid to Education indicates that, in the last academic year, 1953-1954, teachers in privately endowed, independent colleges and universities were paid an average salary about $1000 less than that paid to faculty members in tax-supported institutions. The same study indicates that salaries far below the average are especially common for faculty members in the small private liberal arts colleges. This study found that during the last academic year the average salary of all college and university faculty members was about $4700.

The special difficulties under which the independent colleges and universities, and particularly the independent liberal arts colleges, are laboring to get back on their feet financially have been discussed in previous editorials in this series. These difficulties underline the need of special help for these institutions to which business firms are now contributing in increasing volume. However, the problem of providing better salaries is not peculiar to any particular type of institution.

Faculty Members Not Greedy

It is not easy to prescribe a precise standard of fair pay for college and university faculty members. This is partly because they put less weight relatively on money rewards than they put on rewards of scholarly accomplishment and prestige. Consequently, they have consistently been willing to work for very modest salaries in relation to the intellectual ability, education and application required. Obviously, however, it is the dictate both of fairness and good judgment to see that faculty members are given a roughly proportionate share in the general prosperity. Indeed, their crucial role in our society could be made to justify a larger share than this.

There is no way to know with any degree of precision what the underpayment of our college and university faculty members over the past 14 years has actually cost the nation in terms of reduced quality of intellectual performance of those institutions. One reason is that the damage has been minimized by the devoted services of many faculty members who have loyally stuck to their jobs in spite of the great financial discouragement.

It is obvious, however, that, if no grave deterioration in the intellectual performance of our colleges and universities has occurred so far, it is because we have been living on borrowed time. It is time borrowed from faculty members who have, in effect, been subsidizing these institutions by their financial sacrifice. This arrangement is not only a menace to the cultural and intellectual life of the nation, it is also a menace to our national security in a time when successful national survival may well depend in peculiar degree on the full development and utilization of our intellectual resources. We depend on our college and university faculties pre-eminently to provide this development. Adequate financial reward for such service is an elementary form of national insurance.

Many of our colleges and universities are working hard to improve the financial lot of their faculty members. Business firms are also playing an increasing role of providing the necessary financial assistance. The methods being used by business for this purpose will be the subject of another editorial in this series. However, **vastly more must be done, and quickly, to stop the financial beating being taken by our college and university faculty members if the nation's welfare and safety are to be properly protected.**

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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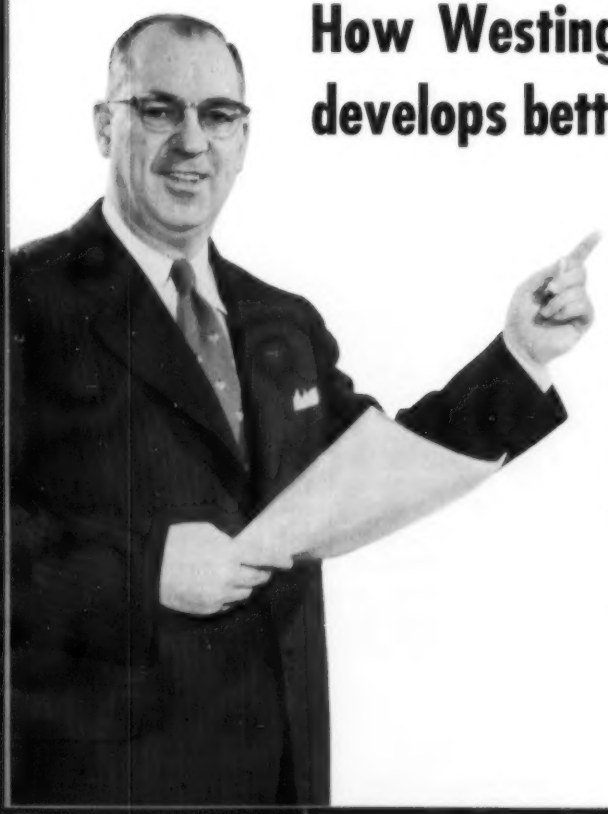
Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

A. C. Monteith, Vice President, Engineering, tells you . . .



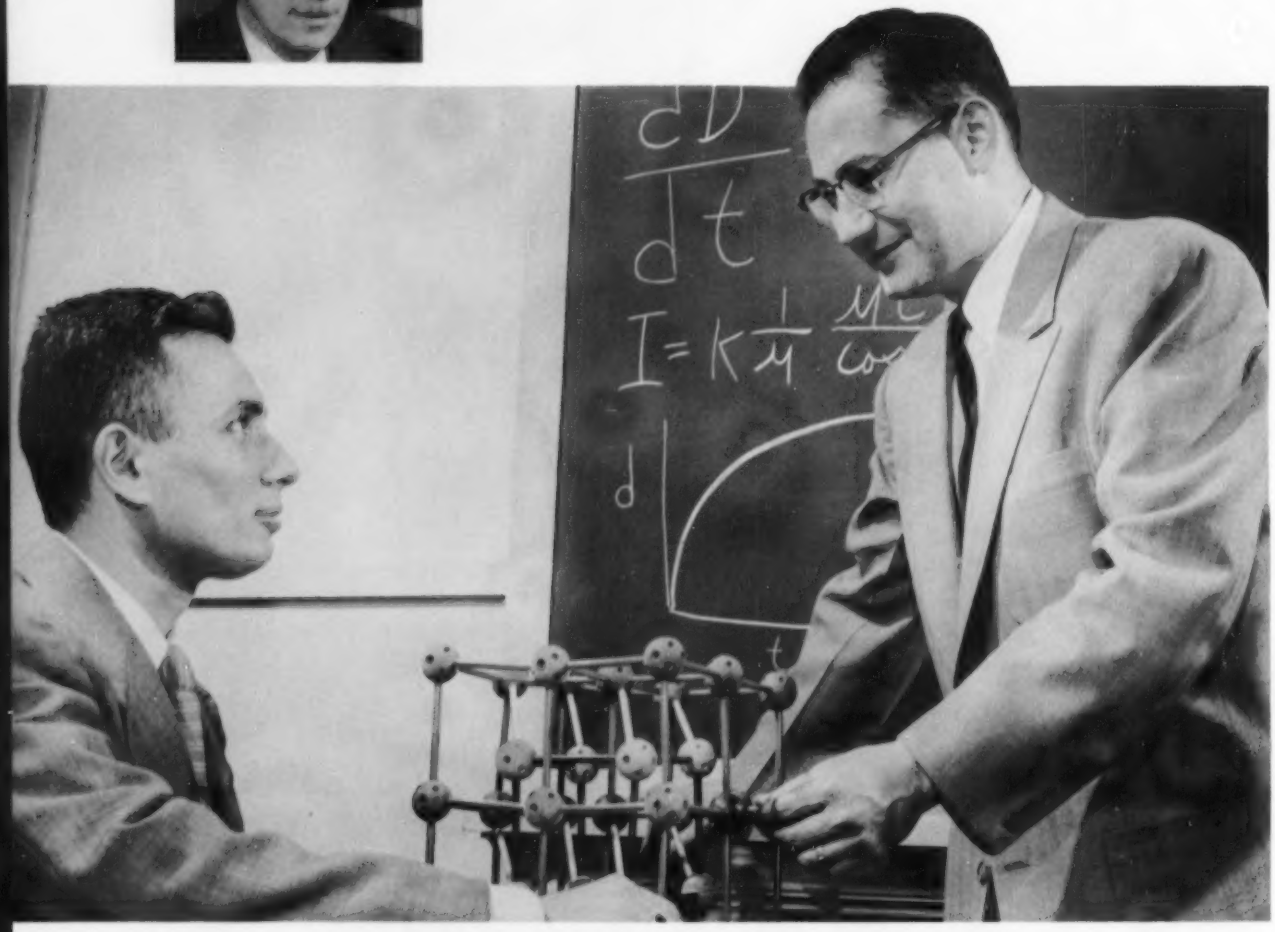
How Westinghouse engineering develops better products, better systems

This team of Westinghouse engineering talent is well known to you. Guiding large staffs of engineers . . . in hundreds of departments and laboratories from end to end of the Westinghouse Electric Corporation . . . they maintain a balance of engineering from fundamental research to the engineering of products and systems.

These outstanding engineering leaders in the electrical industry help you provide more electrical energy to more people at less cost.

The following seven pages will show you how well Westinghouse engineering facilities are matched to your needs for better products, better systems. ——→

Dr. J. A. Hutcheson, *Vice President and Director of Research*



Dr. A. Wexler (right) Manager of Magnetics and Solid State Physics Research. This activity is making significant contributions to new and better apparatus. Here Dr. Wexler discusses grain orientation with Dr. Wiener, one of his staff.

New ideas evolve from new knowledge

Fundamental research at Westinghouse reaches into the void where no knowledge now exists—finding the reasons *why* matter and energy behave as they do. Because these reasons are constantly opening doors to electrical progress, there is no greater facility for service to the electric utility industry.

When it was discovered, for example, that grain-oriented iron magnetizes with less energy, the superior Westinghouse Hipersil® core was developed . . . the most compact and efficient ever devised. From further inquiry into ferromagnetism, entirely new alloys may be created to provide equipment of revolutionary performance.

We now know that elongation of crystal lattices under magnetization sets up the vibration that becomes magnetic noise. The problem: Why do they elongate? Once we have answered that question, it may point a way toward elimination, not just cancellation, of "transformer hum."

Why does insulation insulate? Because we found the answer to that question, one development in solventless resins paved the way to Thermalastic® insulation . . . the insulation which has literally set new standards of apparatus performance.

Westinghouse Research is directing engineering progress along surer, shorter, more predictable paths. It offers you . . . now and in the future . . . equipment that does more and does it better.

L. R. Hill, *Manager of Materials and Equipment Engineering*

New ideas take direction from applied research

In the broad span between fundamental research and the final product, the Materials Engineering Laboratories play the vital role of turning new ideas and materials into practical applications.

The versatile talent here is devoted to probing, exploring, identifying the practical. *Sureness* is designed into an idea before it leaves this department. Some projects are carried to design-sample stage; others, as far as pilot plant production. When thoroughly investigated, projects are turned over to operating divisions for final design and production.

Staffed by mathematicians, as well as engineers, the Materials Engineering Department calculates the probability of success of projects before they are ever begun. This analytical processing of new knowledge provides maximum impetus to discoveries of great promise, and brings you better products, sooner, more economically.

Dr. S. J. Angello, Manager, Semiconductor Engineering, exhibits a new semiconductor in which impurities have been reduced to one part in ten billion—an outstanding metallurgical accomplishment that may accelerate progress on lightning arresters and other apparatus.

"Assistant brain" in Materials Engineering is the digital computer used in calculating probability of success of experimental projects, and in fast, precise analysis of data.

The Magamp* regulator and excitation system was developed by Materials Engineering to provide reliable regulation for synchronous machines. This is the Magamp pilot plant.

**Trade-Mark*

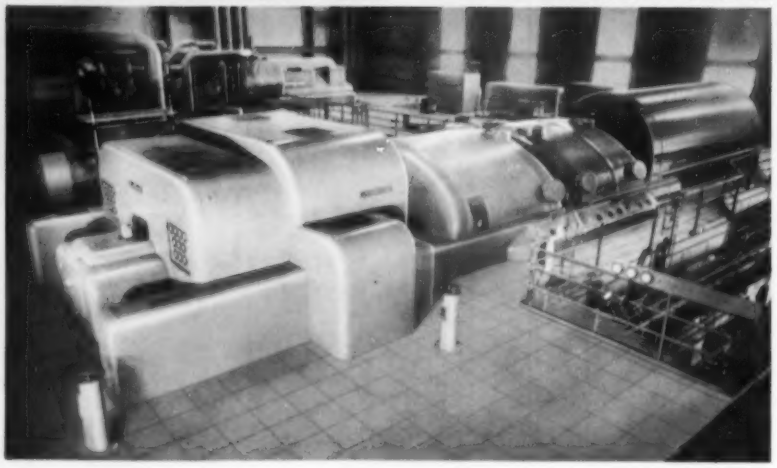
YOU CAN BE **SURE**...IF IT'S Westinghouse

New ideas become new products through design and manufacturing engineering

Whether the project is a new product, or an improved product, it is in Design Engineering that final physical form is decided, and in Manufacturing Engineering that it is achieved. Here, new alloys become turbine blades; an insulation development becomes Thermalastic insulation for generators. Here, products are designed that not only meet Westinghouse standards of reliability, but that are practical to produce, competitively priced, and suited to your requirements.

Ever-increasing demand for higher equipment capacity and lower cost per kilowatt will be met by

Design Engineering Departments, such as this, throughout the many divisions of the company are centers of creative engineering, providing continuing progress in products for the industry.



This modern tandem-compound, turbine-generator unit is one of the largest 3600-rpm, single-shaft machines in service. Already new achievements have raised sights to 275,000 kw and beyond . . . at supercritical pressures and at considerably higher temperatures.

YOU CAN BE **SURE**...IF IT'S

the new Westinghouse supercritical-pressure turbine-generator. This record breaking unit will be designed for 5000 psi, 1200° F. Even at 5000 psi, 1150° F—at which it will operate initially—station heat rate will be much better than the most efficient station existing today.

Generator inner-cooling is another great engineering development of Westinghouse—making possible turbine-generators of 275,000 kw and larger, on a single shaft. To dissipate heat more effectively than ever before, hydrogen is literally blown inside both rotor and stator conductors.

Thermalastic insulation, in addition to providing never-before-achieved performance for turbine-generators, is now being applied with outstanding success to virtually all types of heavy rotating electrical apparatus offered to utilities.

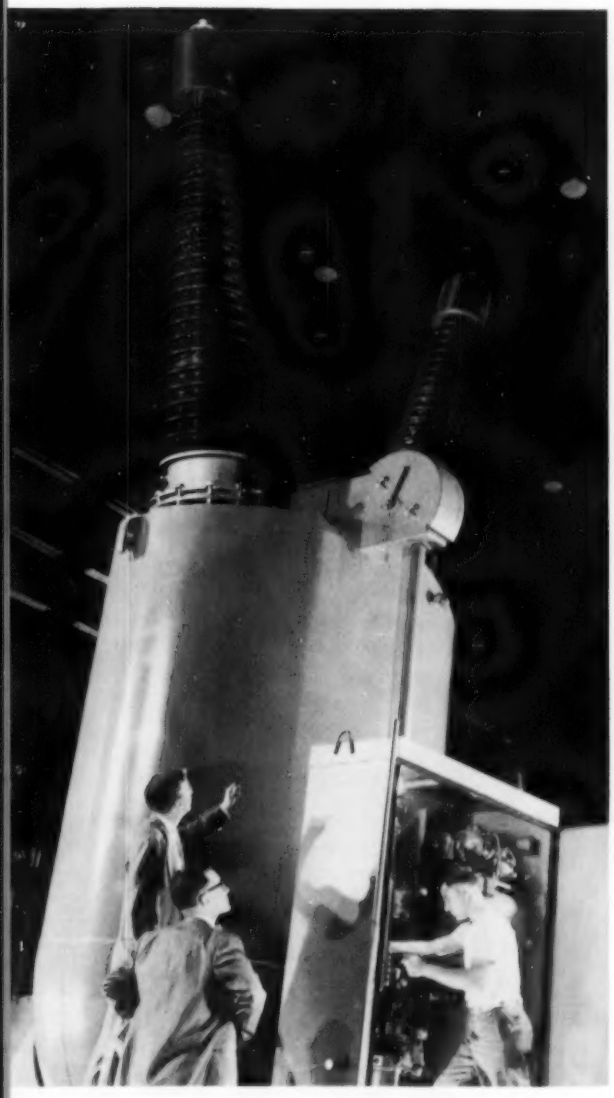
Advancements like these are sweeping aside the limits of turbine-generator capacity, and are establishing new criteria of efficiency and performance.

Let's consider, too, the power circuit breaker. Under guidance of Westinghouse creative engineering it has grown to the modern giant, "Big Ben," capable of interrupting 25,000,000 kva at 330 kv.

With the introduction of the multiflow grid, in 1941, Westinghouse provided the industry high breaker capacity in substantially smaller tank sizes, and cut arcing time from eight to three cycles. And, in 1950, Westinghouse brought out the Watchcase* breaker design, reducing oil requirements 50%.

Today, with an ever-growing investment in design leadership, Westinghouse effectively enables you to transmit larger and larger blocks of power in a manner that is both practical and profitable.

**Trade-Mark*

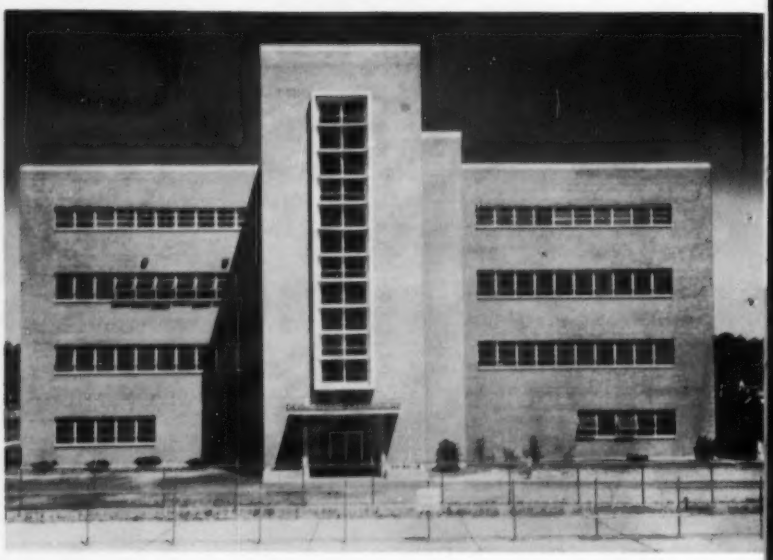


H. N. Muller, *Assistant to the Vice President, Engineering*
Dr. J. A. Hutcheson, *Vice President and Director of Research*
D. E. Inman, *Engineering Manager, General Products Divisions*
D. C. Burnham, *Vice President, Manufacturing*
J. C. Fink, *Engineering Manager, Apparatus Products Divisions*
R. C. Bergvall, *Engineering Manager, Defense Products Divisions*

Watchcase circuit-breaker tank design reduced oil content from 20,000 to 9600 gallons . . . another great power breaker advancement by Westinghouse engineering.

Westinghouse

Over 200 laboratories are the workshops of Westinghouse engineers



Advanced research and development on steam and gas turbine equipment is conducted at the new Westinghouse Laboratory near Philadelphia. Here, 100 engineers and technicians work with the world's most modern facilities. Out of this laboratory will come the great developments of the future, helping the utility industry produce kilowatts at the lowest possible cost.

The Westinghouse High Power Laboratory at East Pittsburgh, Pa., is truly a design tool. Accompanying product development each step of the way, this huge facility is a proving ground for testing apparatus under actual fault conditions, before it is produced commercially . . . before it is offered to you.

The new Research Center just outside of Pittsburgh will house the finest facility of its kind in the industry.

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J. E. Barkle, *Manager, Electric Utility Engineering*
M. B. Wyman, *Manager, Engineering and Service*
Dr. E. L. Harder, *Director, Analytical Section*

Engineering teams tailored to your needs

Here is Operation Interchange—Westinghouse Engineering and Service Department—where problems and needs of the industry are interpreted in terms of new products, applications and system ideas. This huge, closely knit organization of engineers and analytical facilities brings the best possible combination of engineering and service to bear on electric utility problems.

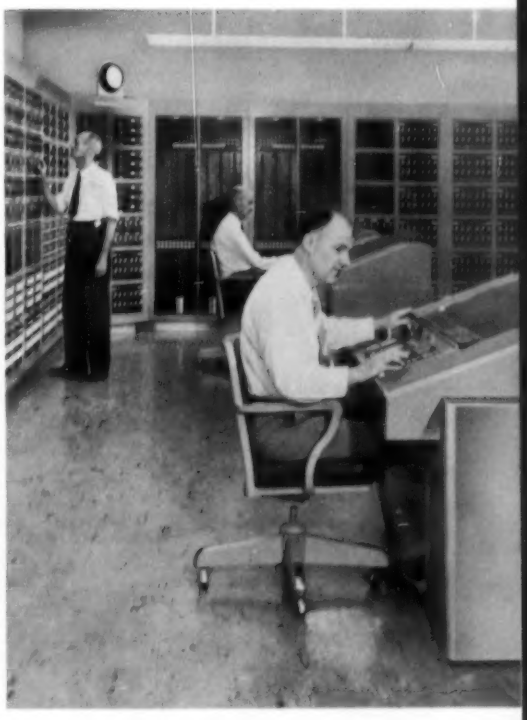
The focal point is the well-known Electric Utility Engineering Group at East Pittsburgh. The clearinghouse for all our utility engineering activities, it applies broad knowledge of the entire industry to your individual problems.

Westinghouse Consulting and Application Engineers in the field assist you with on-the-spot problems. They are equipped with a wealth of product application and system information, continually augmented by the Utility Engineering Department.

Westinghouse Service Engineers are located throughout the country to aid you in installation and operation of new apparatus and in servicing, inspecting, maintaining.

The finest analytical and computing facilities available back these engineers in their solutions of your problems. Outstanding examples are the digital and analog computers, and the a-c network calculator.

Your engineers will have valued assistance in Westinghouse specialized experience, and extensive laboratory and analytical facilities.



World's largest network calculator makes possible the solution of problems heretofore impossible.

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Better equipment, better methods, better systems . . . and any Westinghouse service that will help you achieve them . . . that is what the Westinghouse sales engineer is selling. Through him, your problems or requests will open doors throughout the company, from research to installation service. Your Westinghouse sales engineer is *The Man With The Facts*—to help you convert needs into facilities, to help you market more power, more efficiently, more economically.

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CP-1027

IES Conference in the Making

Three regional conferences in a row will give lighting men the latest information as the Illuminating Engineering Society comes West to its membership. The society's president, Duncan M. Jones, Curtis Lighting of Canada, Montreal, and Dr. Erwin F. Lowry, Sylvania Electric Products, Salem, seem assured for all three conferences, the Intermountain at the Westward Ho Hotel, Phoenix, April 11-13, the South Pacific Coast at the Statler Hotel, Los Angeles, April 14-15, and the Pacific Northwest at Harrison Hot Springs Hotel, British Columbia, April 25-27. E. W. Beggs, commercial engineer, Westinghouse Lamp Division, will present the "Progress Report" at both the Los Angeles and Phoenix meetings. Kirk Reid, General Electric Co., is scheduled for both Phoenix and Los Angeles and Walter Potter, G-E Lamp Division, Portland, will give the progress report at Northwest meeting.

J. P. Whitnell, Arizona Public Service Co., Intermountain Region conference chairman, tentatively has booked also A. A. Byer, Cold Cathode Lighting Corp.; Dr. John Kraehenbuehl, University of Illinois; Henry Sargent, president, Arizona Public Service Co., and G. B. Buck II, General Electric Lamp Division, Denver, regional vice-president. Along with the IES conference, the National Council will hold its meeting in Phoenix April 13, the first such meeting in the West.

South Pacific regional conference of which F. J. Rohring, Southern California Edison, is chairman, opens Wednesday evening with a welcome by E. W. Biscailuz, Los Angeles County sheriff, a strong advocate of highway lighting, and will feature the progress report presented by Beggs. Morning session, April 14, will continue lighting for traffic safety. L. M. K. Boelter, dean of Engineering Department, UCLA, will lead a panel representing city, state, IES, utilities and manufacturers viewpoints. President Jones will present his message and Dr. Lowry is scheduled for an address "Light Marches On."

The afternoon session will start with a garden lighting talk by F. B. Nightingale, a residential talk by Roy E. Dahlin, Southern California Edison, and conclude with a runoff of the "My Most Interesting Lighting Job" contest. The president's banquet and dance will be that evening.

Kirk M. Reid, application engineer, Nela Park, will be principal speaker and panel discussion leader on light sources for the April 15 morning session. Benjamin Benson, Benjamin Electric Mfg. Co., Des Plaines, talks on "New Standards and Trends in Industrial Lighting" and a panel discussion on floodlighting will be led by Ted Shepperd, Department of Water & Power. School and office lighting will be handled by a panel that afternoon. E. H. Salter, Electric Testing Laboratories, New York, will discuss auxiliary equipment for lighting. Lighting for merchandising will be covered from two phases, interior by Carlton Thompson, San Diego G&E, window lighting by John Walsh, PG and E.

A PCEA technical subcommittee meeting of the highway lighting committee will be held a day ahead of the IES conference.

The Pacific Northwest regional conference will have in addition to President Jones, Dr. Lowry, R. A. Yates to speak about luminous ceilings, Irving Smith to show "Lighting in 3-D," O. C. Westberg to demonstrate building floodlighting, James MacCarthy about "The Magic Lamp in Agriculture," George W. Douglas, "Designs in Glass," Walter Potter the "Progress Report" and other speakers to discuss "Lighting for Comfort." The runoff for the regional winner of the "My Most Interesting Lighting Job" contest will be held also.

Early registration and hotel reservations are urged for all of the conferences.

IES

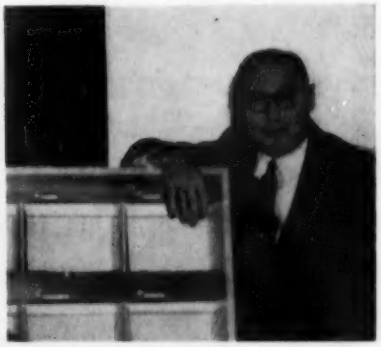
Contestants for the "My Most Interesting Lighting Job" will be holding their runoff in each of the chapters in the West in March. San Diego Chapter will have nine entries. Southern California Section reduced the runoff to the three judged best by the committee.

IAEI

The series of annual chapter meetings of the International Association of Electrical Inspectors begins in April. Dates and places of many have not yet been announced but the Utah Chapter has planned its meeting at the Newhouse Hotel April 25, according to H. S. Morr, Utah Fire Rating Bureau, chairman of the chapter. The Nevada Chapter will meet April 23 at Ely, Nev. J. Hyde Stayner is arranging the program.

EMEA

Jack Singleton, Lever Bros., was elected president of the Electrical Maintenance Engineers Association of Southern California at the executive committee election last month. Aubrey La Force of Axelson Mfg. Co. was named first vice-president, Charles Hays, Electrical Estimators, second vice-president and Dan Slight, General Electric Co., secretary-treasurer. Hays, Harry Huff and Henry Schumacher were new members elected to the executive committee in addition to the holdovers, Charles Doane, Mike J. Boyak and Carl Ladenberger. At the Feb. 16 meeting, Thomas M. French of Neely Enterprises presented a talk on "Closed Circuit Television" and "Electronic Counters." With a banquet April 5 at Rodger Young Auditorium as the kickoff, the Electrical Maintenance Conference is scheduled at the University of Southern California April 6-7. Conference Chairman Charles W. Doane of Larsen-Hogue Electric Co. announces that H. F. McCullough, general manager, service shops, General Electric Co., New York, will address the banquet and that 24 leaders in the industry will participate in talks and panel sessions at the conference.



Sylvania's Don Caverly addressed groups

NISA

Northern California Chapter of the National Industrial Service Assn. elected Fred Brand of City Electric Co., San Francisco, as chairman at its annual meeting in February. Jack Van Allstyne, Sacramento, was elected vice-chairman. Henry Heulke, North Bay Electric Works, San Rafael, was re-elected secretary-treasurer.

EMR

James T. Wall of Denver, Young Electric & Mfg. Co., was elected president of the Rocky Mountain Electrical Manufacturers Representatives club. Clyde P. Elliott was named vice-president, Arthur E. Bacon, National Electric Products Corp., secretary and James M. Humphrey, Appleton Electric Co., treasurer.

Expanding the source for Utility Revenue!
An Electric Range for Every Purse and Purpose
in the Hotpoint
Golden Anniversary Range Line
...at prices ranging from $189.95 to $499.95

HOTPOINT SUPER DE LUXE DOUBLE OVEN LIGHTED PUSHBUTTON AUTOMATIC ELECTRIC RANGE

- NEW Super Speed Calrod® ... World's Fastest Surface Unit
- NEW Handi-Raise Broiler and Handi-ever Grill
- NEW GIANT Super Oven and NEW Roto-Grill
- NEW Plug-in Golden Griddle
- NEW Automatic Meadtimer

HOTPOINT DE LUXE PUSHBUTTON AUTOMATIC ELECTRIC RANGE

- NEW Super-SPEED Calrod Surface Unit
- GIANT Super Oven Color-Keyed Pushbutton Controls
- Plug-in Golden Griddle and Golden Fryer Available
- Raisable Thrift Cooker
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- Golden Bake and Golden Broil Calrod Units

HOTPOINT SUPER-30 AUTOMATIC ELECTRIC RANGE

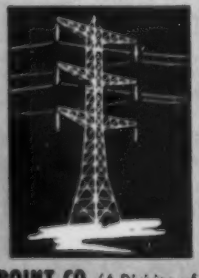
- NEW Super SPEED Calrod Surface Unit
- Automatic Roto-Grill and Thrift Broiler
- Raisable Thrift Cooker with provision for Plug-in Golden Fryer
- Golden Bake and Golden Broil Calrod Units
- GIANT Super Oven and Automatic Time Center

HOTPOINT STANDARD AUTOMATIC ELECTRIC RANGE

- New Super SPEED Calrod Surface Unit
- GIANT Super Oven with Oven Signal Light
- Golden Bake and Golden Broil Calrod Units
- Reversible Roto-Rotisserie
- Electric Appliance Outlet
- Automatic Oven Temperature Control

HERE ARE JUST FOUR MODELS IN A COMPLETE LINE THAT OFFERS . . .

Again, Hotpoint



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Have Your Hotpoint Distributor Show You the *Complete* Line Which Includes the Sensational Hotpoint Customline *Built-in Electric Range Ensemble* . . . and show this great line on your display floor.

looks at Tomorrow, Today!

HOTPOINT CO. *(A Division of General Electric Company)* **5600 West Taylor Street, Chicago 44, Illinois**

PCEA Panorama

A conference, sponsored jointly by the Administrative Services Section of the Pacific Coast Electrical Assn. and the Accounting Section of the Pacific Coast Gas Assn., will be held April 6 and 7 at the Hotel San Marcos, Chandler, Ariz.

Arrangements for the conference are being handled by J. T. McNab, Arizona Public Service Co., representing the PCEA, and J. L. Liecty, also of Arizona Public Service Co., who is representing the PCGA.

Subjects slated to be covered during the two-day conference: "Plant Expenditures," sponsored by Robert C. Witter Jr., Southern Counties Gas Co.; "Records Management," sponsored by Haven C. Smith, PG and E; "Lands and Rights-of-Way," sponsored by T. J. Frost, Arizona Public Service Co.; "Purchasing," sponsored by Arthur W. Holt, Arizona Public Service Co.

The school lighting committee of the PCEA reports completion of Project 1 of its assignment. This project, "A Compilation of Comprehensive Bibliography of Books and Articles Relating to Lighting School Rooms," was undertaken by the University of California at Berkeley with funds provided by a grant-in-aid from the PCEA.

A second project, now under way at the University of California in Los Angeles, will study the "Thermo-Acoustical Effects of Various Methods of School-Room Lighting." Upon completion of the project a report of the findings will be issued.

EID

Electrical Industry Depository of California held its annual dinner and election of officers at the Mark Hopkins Hotel, San Francisco, Feb. 8. Arthur Souza, Broadway Electric Co., San Leandro, is president and Conrad Abbett, Abbett Electric, San Francisco, led the program. Nominated for the five directors from the San Francisco side of the bay were J. Conrad Abbett, Matt Buzzell, Buzzell Electric Works; Garth Chamblin, California Electric Construction Co.; Fay Lemoge, Lemoge Electric, and Mervin Mayer, Pacific Electric & Mechanical Co. Alameda County directors elected were Walter Vance Jr., California Electric Co.; William Nagel, A. Neri Co. of California; Ralph Askin, Ets-Hokin & Galvan, and Robert Schwartz, Schwartz & Lindheim.

Arthur Rowe, custodian, addressed the 75 contractors present, reviewing the progress of the big depository. William A. Cyr, consultant, Biddle Trade Bureau, addressed the meeting.

Both presidents of NECA chapters and both old-timers and old friends in electrical contracting, Emil Weber of San Francisco and L. G. Jeffry of Fresno met in the latter's office with Ray Buckley, chapter manager of East Central California Chapter. Weber also is president of the California Conference of NECA Chapters a second term

Paul Benge, left, turns over to Rex Moore Jr. the presidency of the Sacramento Valley Chapter, NECA. J. E. Newmarch, past president, was annual installation dinner chairman

New officers of Electrical Industry Depository of S. F. Bay area: seated—Conrad Abbett, Walter Vance, William Nagel. Standing—Mervin Mayer, Arthur Souza, Matt Buzzell, Ralph Askin and Robert Schwartz. Garth Chamblin and Fay Lemoge were absent

Save up to 8% on Power

Many utilities discover new economies with standardized designs... lower initial cost, shorter shipment, easier and faster installation

ALLIS-CHALMERS POWER Transformers

Three Purchasing Case Histories Tell Actual Dollar Savings Possible

1 **A MIDWEST UTILITY SAVED** $6,065.00 on one purchase of an Allis-Chalmers standardized unit on which it was possible to choose a different rated high voltage. For years this utility had purchased transformers with rated high voltage 66,000 delta and four 2½% full capacity taps below normal. By rating a standardized unit with high voltage of 62,700 and full capacity taps of 66,000-64,350-61,050 and 59,400 — a standardized unit was purchased at an approximate savings of 7%.

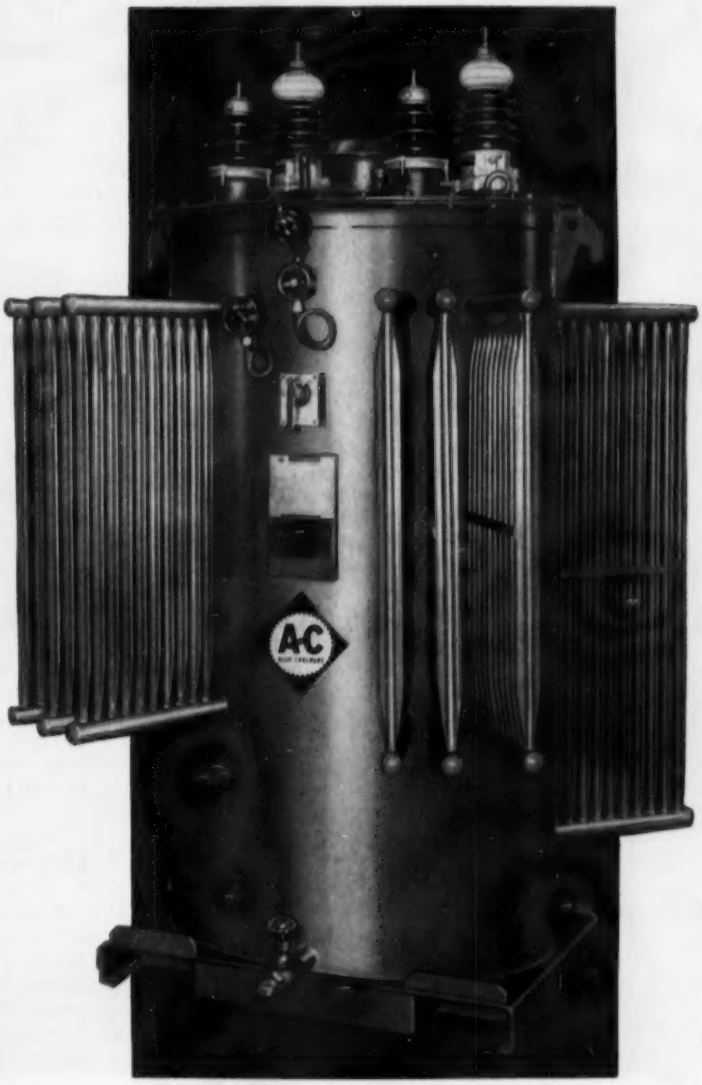
2 **AN EASTERN STEEL COMPANY SAVED** $1,920.00 with an Allis-Chalmers standardized unit. The new transformer, high voltage 67,000 volts, low voltage 7200 volts, will operate at 6900 volts at slightly reduced kva. This makes possible operation in a bank with an existing 6900-volt transformer. This customer foresees even greater savings when more standardized units are purchased.

3 **A SOUTHERN UTILITY SAVED** $1,557.00 by purchasing Allis-Chalmers standardized power transformers. It was found that three 1667-kva single-phase transformers rated at 13,200 voltage delta with two 2½% full capacity taps above and below normal to low voltage 2400/4160Y could be paralleled satisfactorily with existing non-standard transformers rated 1667 kva having a high voltage of 13,200 delta and taps at 12,540-12,210-11,880 to low voltage 2300/4000 wye (the transformer to be over-excited for 2400/4160 wye output).

ALLIS-

Transformers

Allis-Chalmers standardized design power transformers offer utilities attractive savings in time and money compared to special designs. Standardization eliminates or reduces engineering and manufacturing time, results in savings up to 8% of the total cost of a transformer. Delivery can be made faster than with special transformers. Installation is simplified by standardized location of accessories. If certified drawings are required, they can be obtained immediately in many cases.



Other Features Available

Manufactured in accordance with NEMA and ASA C57.12a Standards, these transformers are available in ratings up to 5000 kva single phase and 10,000 kva three phase. Considerable flexibility is available too. Other features include variations in primary voltages, junction boxes, different types of oil preservation, as well as other mechanical and electrical features.

It will pay to get complete details on savings made possible by Allis-Chalmers standardized transformers. Call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin, for more information.

A-4429

A-C ALLIS-CHALMERS

CHALMERS

THE MONTH IN BRIEF

Columbia Basin Water Outlook "Poor"

Columbia average precipitation and low snow accumulation on the Columbia basin watershed mean a "poor outlook" for water supply in the coming summer runoff season. The U. S. Weather Bureau and Soil Conservation Service jointly forecasted about 72% of the 10-year average (1943-1952) at The Dalles, 59% for the Snake River at Clarkston and 81% for the Columbia at Grand Coulee. Central and eastern Oregon will experience the most critical short supplies.

California-Oregon Compact Proposed

California and Oregon congressmen have pledged speedy action on legislation authorizing a compact between the two states over future use of the Klamath River for irrigation and power. Two bills introduced in Congress would permit a compact to be drafted and submitted to each legislature. The compact would later need ratification by Congress.

New Generator in Service

Another 40,000-kw capability was added to the Pacific Northwest hydroelectric pool the night of Feb. 15 when the second of three generators slated for Lookout Point power house put energy on the line. Corps of Engineers reported that it appeared the third will be ready in April, as well as the single 15,000-kw generator at the downstream regulation dam at Dexter.

Sovereignty Case Before High Court

The U. S. Supreme Court is hearing arguments from the U. S. and Oregon on their claims of sovereignty involving the hydroelectric development at the Pelton site on the Deschutes River in central Oregon. Basically the question is broader than this single project since the issue is important to other Western states. The court could decide which government has the controlling authority to determine the best use of nonnavigable waters wholly within a state.

Citizens Utility Reduces Rates

Citizens Utility Co. of Wallace, Idaho, has agreed informally to reduce its residential rate about 12% pending a hearing by the State Public Utilities Commission in late April or May. The rate cut amounts to about $20,000 to $25,000 annually. A petition with 625 signers carried a complaint that rates were too high.

Bonneville Buys Transmission Line

Lane County, Ore., Electric Cooperative has accepted a $366,566 check from the Bonneville Power Administration for a 115-kv transmission line the co-op built between Lookout Point and Oakridge. BPA purchased the line to permit service to the planned Hills Creek Dam east of Oakridge and to transmit energy from Lookout Point power house. The line cost $450,000 but the final payment will be made when right-of-way titles are cleared by Lane.

REA Suit Against Utility Dismissed

Public Service Co. of Colorado won dismissal of an injunction suit by Union Rural Electric Assn. of Brighton that sought to block the private utility's service to the 6,000-home Western Hills subdivision. Two PSC motions, both granted, were "the court lacks jurisdiction over the subject matter," and the Union REA "failed to exhaust its administrative remedies."

Co-ops Lose Tax Exemption

A bill to extend property tax exemptions to Wyoming REAs was killed in the State Senate by a one-vote margin. REAs had been exempt from property taxes since 1949 under a law that expired Feb. 15. The House voted to extend the exemption two more years but it died in the Senate in the last day of the current session.

New Hydro Project for Petersburg

The town of Petersburg, Alaska, will open bids March 19 for construction of a $750,000 hydraulic project at Blind Slough, about 17 miles from the town. The project will utilize water from the Crystal Lake watershed.

Cowlitz Dams Threatened by Taxes

Two bills now before the Washington Legislature would require City Light of Tacoma to (1) pay fees to school districts outside the home county of the utility and (2) pay sums in lieu of taxes to the counties outside the home county. City Light officials report that passage of the two bills might increase the cost of the Cowlitz project to a point where it might be unfeasible.

REA Generation in Picture for Colorado

A $9,000,000 farmer-owned generating and transmission system in southwestern Colorado will be under construction before the end of 1955, according to George Wilson, state REA association president. Plans are for management and operation of the plant by Western Colorado Power Co. and ownership by four REAs organized as the Colorado Ute Electric Assn.

Another Delay Action on Compact

Action by the Oregon Legislature toward ratification of the Columbia Interstate Compact appears to be delayed by Sen. Paul S. Geddes, who is recommending postponement until 1957 "to allow full public airing of the issues."

radio began here...

Here is the original miracle upon which all wireless telephony is founded... Lee de Forest's Audion tube.

Today of course it has been improved a thousand-fold... in sensitivity, in power, in range. But this one still stands as the granddaddy of them all.

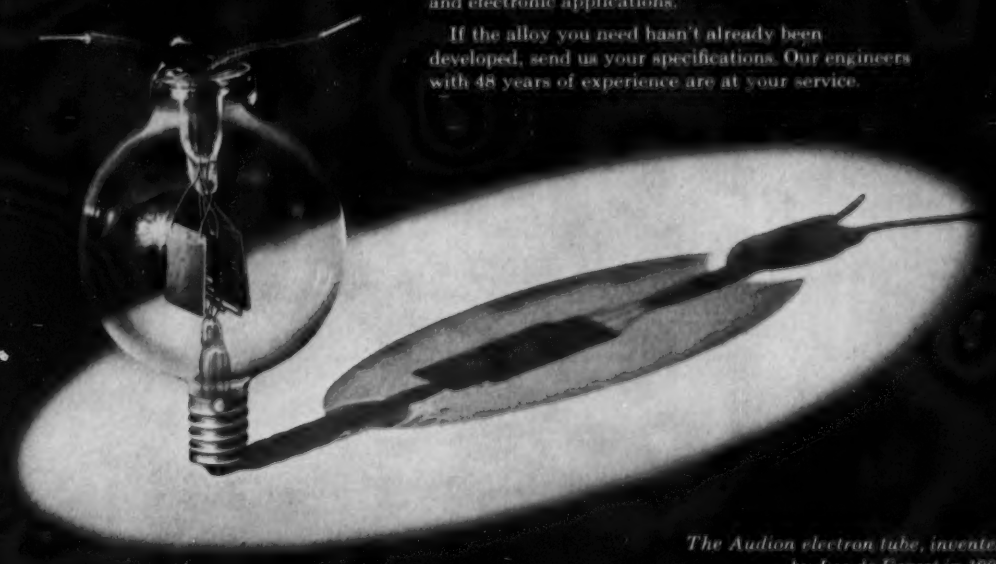
And what has this to do with Driver-Harris? Simply this:

The improvements on the Audion have come about through the combined efforts of thousands of devoted physicists, metallurgists, and engineers, whose increasing skills have in turn been made possible by the production of ever more effective radio alloys. Since the very beginnings of radio, the Driver-Harris metallurgists have led the way in developing these special-purpose alloys conforming to rigid specifications, upon which the performance of electron tubes so largely depends.

With the result that today Driver-Harris sells annually more tons of radio alloys to the makers of electron tubes than does any other supplier.

Driver-Harris makes alloys for every electronic tube requirement: for grids, plates, side rods, glass seals, cathode sleeves and tabs, socket prongs, mica straps. We offer over 80 electrical heat- and corrosion-resistant alloys for various electrical and electronic applications.

If the alloy you need hasn't already been developed, send us your specifications. Our engineers with 48 years of experience are at your service.



The Audion electron tube, invented by Lee de Forest in 1906.

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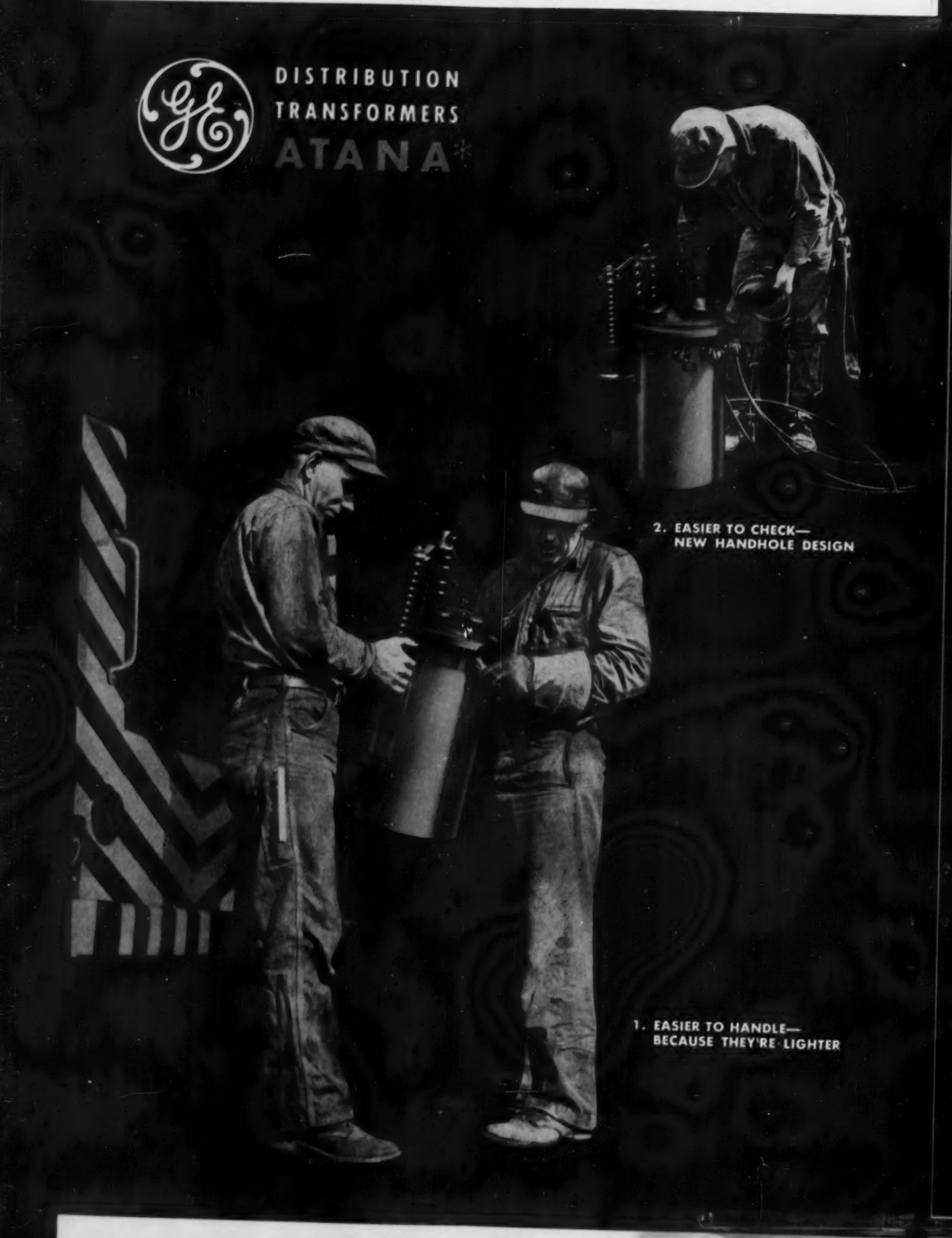

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NEW HANDHOLE DESIGN

1. EASIER TO HANDLE—
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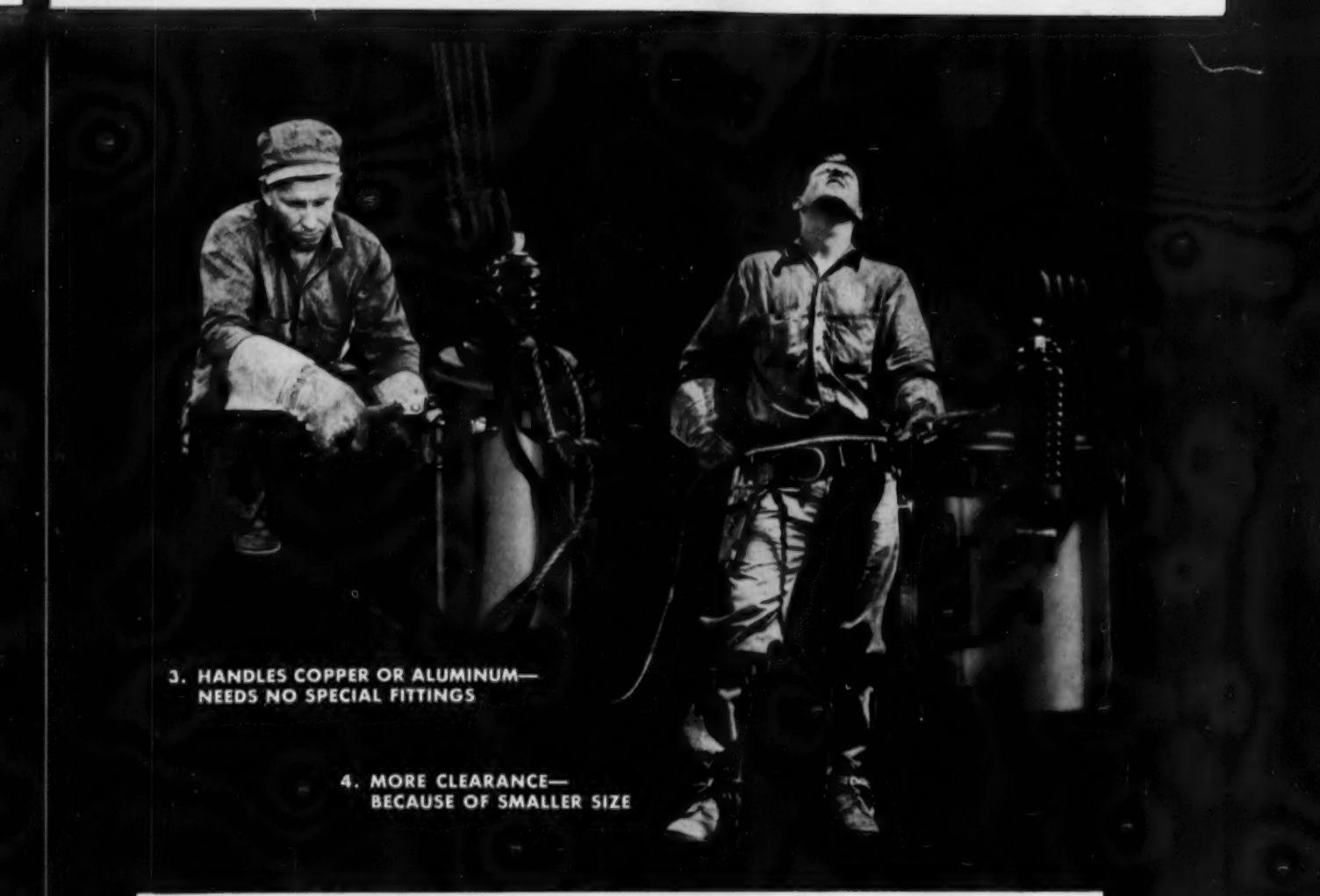

Picture story of a lineman making

BIG SAVINGS ON INSTALLATION

Time and money can be saved when installing distribution transformers. Ask the man who puts them on the pole! He'll tell you that General Electric transformers make his job easier in four ways.

Easier to handle. Lighter weight of G-E transformers means easier handling in warehouses, on trucks, and where it counts most—on the pole. Since 1937 G.E. has cut the weight of many ratings almost in half!

Easier to check. Only a screwdriver is needed to remove or tighten the single bolt which holds the one-piece cover band and the handhole cover. The nitrile rubber gaskets—another G-E exclusive—can be re-used again and again.

Handles copper or aluminum. No special fittings are needed because tin-plating of the terminals and built-in spring tension lick both the corrosion and the "cold-flow" problems of aluminum conductor.

More clearance, G.E. has shrunk sizes as well as weights. Lower heights mean big dollar savings because existing transformers can be replaced by larger ratings without changing poles. 451-21

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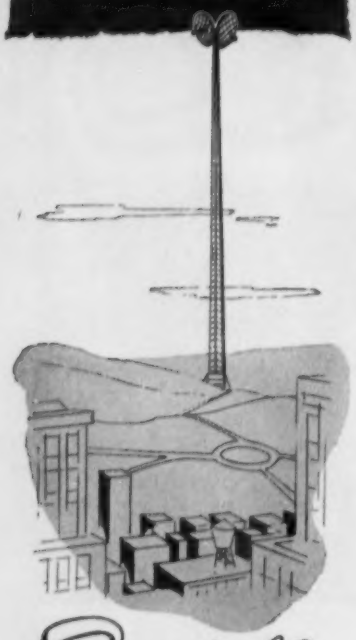

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THIS MONTH'S NEWS

GRANT COUNTY PUD WINS SUPREME COURT DECISION

A Washington State Supreme Court decision in February oleared the way for proposed construction of Priest Rapids Dam on the Columbia River by Grant County PUD.

The six-three majority decision rules out the State Power Commission as developer of the same project, upholding a Grant County superior court order restraining the commission from pursuing its application for a preliminary permit from the Federal Power Commission. Both courts recognized prior rights established by the PUD.

Still not clarified is the constitutionality of the State Power Commission, which was questioned by the PUD in the legal action. It is reported the commission may continue the court action to get an answer to this question.

Senator Nat Washington, Grant County attorney who has been active in pressing the PUD case, said the decision opens the way for construction of the dam within the next two years. The necessary FPC permit is expected by June. Meanwhile, the PUD is faced with finding customers for 1,100,000 kw from the $375,000,000 project so construction can be financed.

Atom Power Group Planning To Build 100,000-Kw Unit

Atomic Power Development Associates, comprised of 25 power systems and others, has "concluded that it would be possible at this time to undertake the construction of a power-breeder reactor having a designed capacity of 100,000 kw of electricity."

That was the report of Arthur S. Griswold, assistant to the president of Detroit Edison Co., to the National Western Mining Conference in Denver.

At the same meeting, Financier Floyd B. Odlum said no less than 4,000,000 kw generating capacity will be powered by nuclear energy by 1965. By 1975, he predicted, atomic-powered plants will reach 40,000,000 kw.

Griswold explained that the power plant his group is considering would not be economical to operate but "the construction and operation of the reactor in question would provide invaluable experience and knowledge. We believe that from such experience it would then be possible to devise a unit which should actually be competitive and thus reach our main objective."

Odlum told the group that uranium-fueled power plants will be under construction by 1960 "not merely as experimental plants like the Duquesne Light Co., now in course of construction, but for the economies involved, on a strictly competitive basis with other fuels." He also pointed out that no plants now operating with water or conventional fuels would be discarded but that nuclear energy would be applied to plants built for future requirements.

FPC Chief Kids "Experts" Of Central Valley Project

Federal Power Commission Chairman Jerome K. Kuykendall told a joint meeting of the Washington and Oregon chamber of commerce managers he feels sure the FPC is capable of deciding the famous Hells Canyon case on its merits, despite the political lightning and thunder of public vs private power interests.

"But I would like it a lot better if there weren't this external heat and pressure."

He reported the FPC hearing examiner in the case hopes to have his report to the commission by May 1. The commission will then listen to oral arguments before reaching a decision. Kuykendall said it would be late July or August before the ruling is announced. He said an appeal through the courts will probably follow.

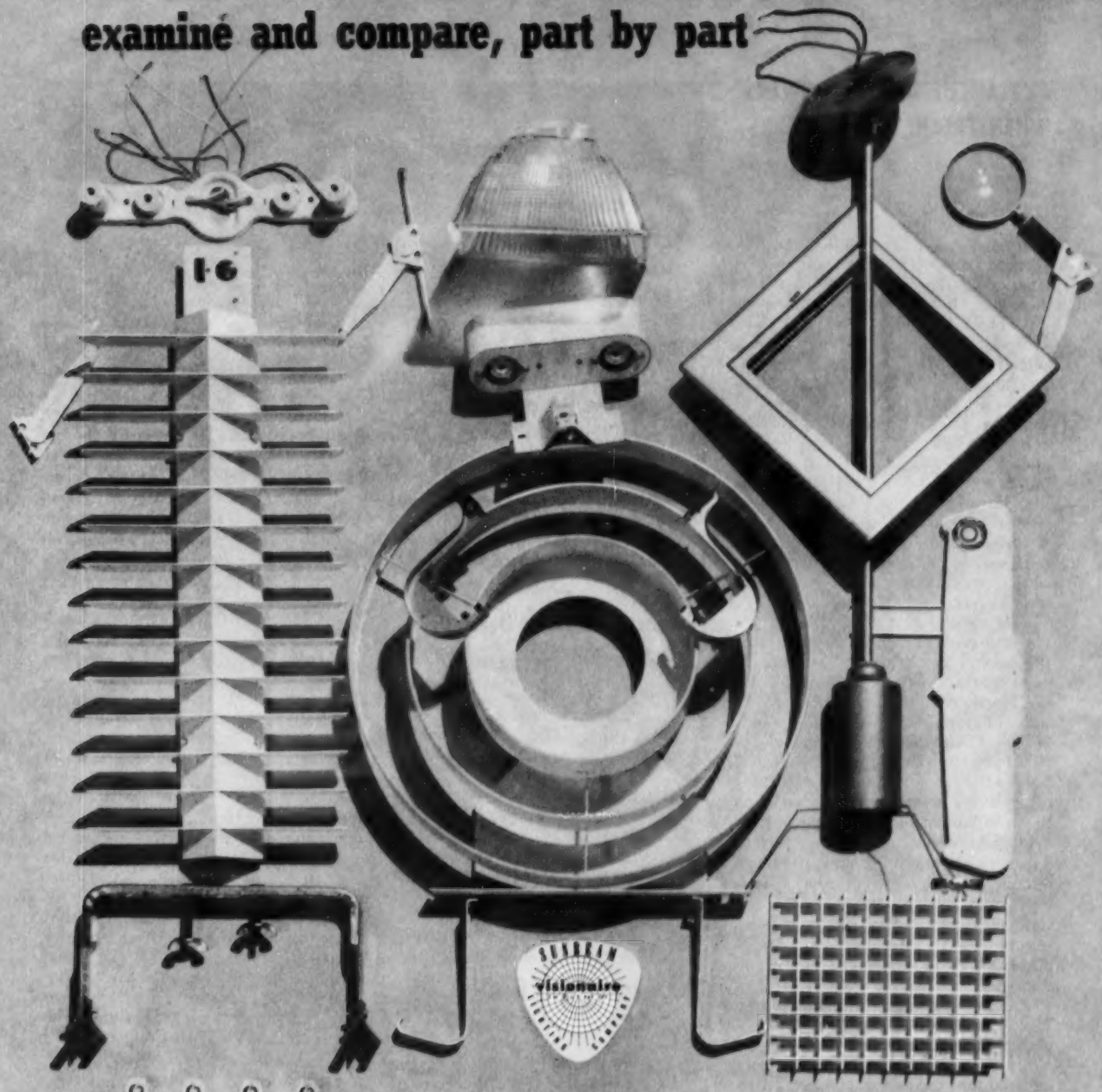
Smiling wryly for reporters, the FPC chairman remarked:

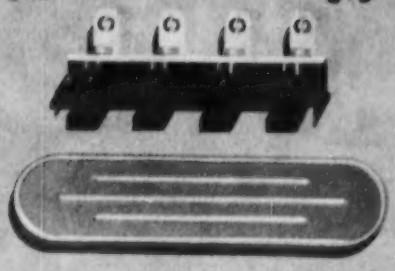
"I'm amazed at how many experts are speaking up with firm opinions, while FPC's examiner has been diligently taking more than 19,000 pages of testimony for use in arriving at our decision.

"W'd like to decide on Idaho Power company's application on its general economic and engineering merits, and I believe we can exclude politics in our final deliberations.

"If the FPC finds a site should be developed by the government it can turn down a private application, but must consider the latter on its merits in the absence of congressional action. Our agency is an arm of Congress, and three successive sessions have declined to approve a Hells Canyon project."

examine and compare, part by part





Would you like to know how to *really* judge a good paint job on a lighting fixture? Write, on your letterhead, for a non-technical leaflet #EL18 on this subject.

We the engineers, designers, tool and die makers, welders, painters, assemblers; all of us at Sunbeam Lighting Company welcome with pride and confidence your critical examination of our work and products. Compare, part by part, a Sunbeam Visionaire® with another similar style and quality fixture. See for yourself our precision forming, clean welding, smooth, properly "aged" enamelling and other unexcelled examples of craftsmanship. Remember too, that only top grade steel and other materials are used in Sunbeam Visionaires®—and that all auxiliary electrical parts are E.T.L. tested and U.L. approved. Examine and compare. You will be convinced that quality Sunbeam fixtures are more economical in the long run.

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AVALANCHE DOWNS TOWERS WHEN FREAK THAW OCCURS

A winter thaw, described as a freak, caused a snow avalanche late in January in storm-swept Kildala Pass that took out three towers, two aluminum and one steel, on the two 300-kv lines feeding the Aluminum Co. of Canada's smelter at Kitimat, B. C., causing a two-week shutdown. Linemen and engineers working around-the-clock in a helicopter-directed operation completed repairs in less than two weeks.

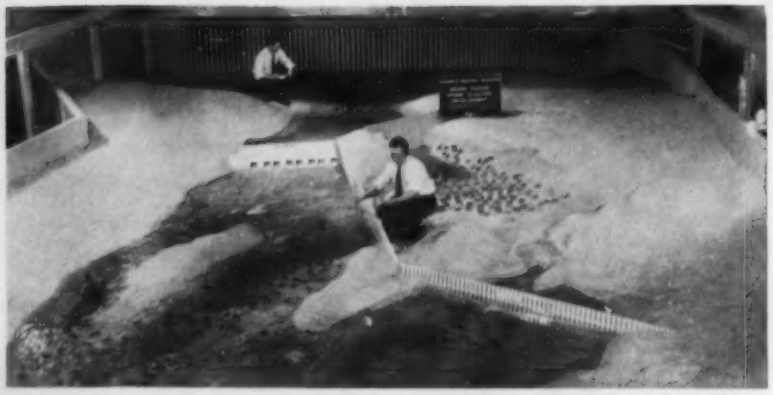
The same mild weather that caused the avalanche lasted throughout the repair period, providing good flying conditions. Little difficulty was experienced by helicopters in getting men and materials to the scene of the trouble. There was little slowdown in the working force of 1,200 men at the Kitimat reduction works since it was necessary to chip out the "frozen" pots so that production could be resumed as soon as power was restored.

The two 51-mile, 300-kv lines between a power plant at Kemano and the smelter at Kitimat have been the most spectacular transmission lines on the North American continent. Possibility of trouble in this 10-mile, 5,000-ft-high Kildala Pass was a calculated risk that had to be taken with overhead lines as there was no other feasible route. Every precaution had been taken to avoid known snowslide, glacier and avalanche areas in locating towers. Through the pass the lines are single circuit, one on conventional latticetype steel towers and the other on uniquely designed and constructed aluminum towers. Conductors are ACSR 3,364,000-cir-mil cables 2.296 in. in diameter, the largest ever fabricated.

The break occurred on a mountain face where the two lines were close together. Snows had filled ravines and gullies; unseasonably mild weather melted the top crust, which froze, creating a massive ice sheet. Snow fell on top of this and then it rained. The rain loosened the snow and started it moving over the ice sheet beneath. The slide gained terrific weight as it moved diagonally down the mountain until it engulfed the towers of both lines, even burying the conductors themselves.

• **The City of Mesa,** Ariz., has put a new 69-kv line into service for improved service and economy of operation. Two new substations were part of the project. Total cost was $85,000.

• **Seattle's** $4,000,000 street modernization program is now complete, according to City Engineer W. E. Parker. It includes better lighting for 360 miles of arterials.



Scale model (1 to 50) of Washington Water Power Co.'s proposed Noxon Rapids development on Clark Fork River in Montana. Preliminary studies on model, built at Washington State College at Pullman, have already saved the power company thousands of dollars by indicating changes in guidewall design. Model helps determine height of cofferdams, amount of channel excavation, size of water passages, what will happen under flood conditions and much other valuable information. Noxon will develop 350,000 kw and cost $85,000,000. Work will start in April if FPC grants the company a construction license

Senator Morse Joins Demos After Period as Independent

Oregon's Sen. Wayne L. Morse is officially a Democrat now.

The possibility of competing against both Democrat and GOP candidates in the 1956 campaign apparently prompted the Senator's action. He registered as a Democrat Feb. 17.

With Morse, the Democrats inherit his strong opposition to President Eisenhower's partnership hydroelectric development.

California Plans Ownership Of Central Valley Project

A feasible plan for California acquisition of all present federally authorized units of the Central Valley Project has been presented to the Secretary of the Interior, according to a report by A. D. Edmonston, California state engineer.

In a report to be presented to the State Legislature, Edmonston said a substantial area of agreement on the proposal has been reached with the Department of the Interior. All administrative understandings are subject to the approval of Congress. The report is that of the Water Project Authority of the State of California, and Edmonston is executive officer.

According to the report, actual payment to the U. S. for the project would fall somewhere between $215,000,000 and $262,000,000.

State acquisition of the project is based on the understanding that all existing long-term power and water sale contracts must be fully respected, the report states. Virtually all the available power and water is already under contract. The state could charge less than at present, but not more.

Edmonston stated that "financing would be by issuance of revenue bonds secured entirely by project revenues, and not constituting any obligation of the state or the taxpayers."

"Conclusions" of the report to the legislature include a statement that ownership and control of the Central Valley Project would "physically integrate" Central Valley with the state-owned Feather River project.

Recommendations made are that current negotiations with the appropriate federal agencies be continued through the 1955-56 fiscal year; adequate funds be appropriated for them and that appropriate legislation be introduced in the 84th Congress.

• **Dedication** of Hawaiian Electric Co.'s Oahu plant addition took place in February. The plant adds 23% to the island's power supply.

• **A bill** to abolish the Montana Public Service Commission, replacing it with a commissioner of public utilities, has been introduced in the State Senate.

• **Some** 375 City Light electrical employees at Tacoma, Wash., have voted to accept a 5c-per-hour wage increase offered by the Public Utilities Board.

• **The Chugach Electric Assn.** of Anchorage, Alaska, has secured the release of a $2,800,000 REA loan on which a "stop order" had been placed last year. It will be used to add a 5,000-kw steam turbine.

Supplementary pages for the BTC Hi-Line Hardware Catalog have just come off the press. These supplements contain blueprints and complete specifications on revisions and additions to our line of Drop-Forged Steel and Aluminum Hi-Line Hardware.

Send for these free supplementary pages and bring your BTC Catalog up-to-date. If you do not already have a catalog, indicate on coupon and a complete, revised copy will be mailed to you without charge.

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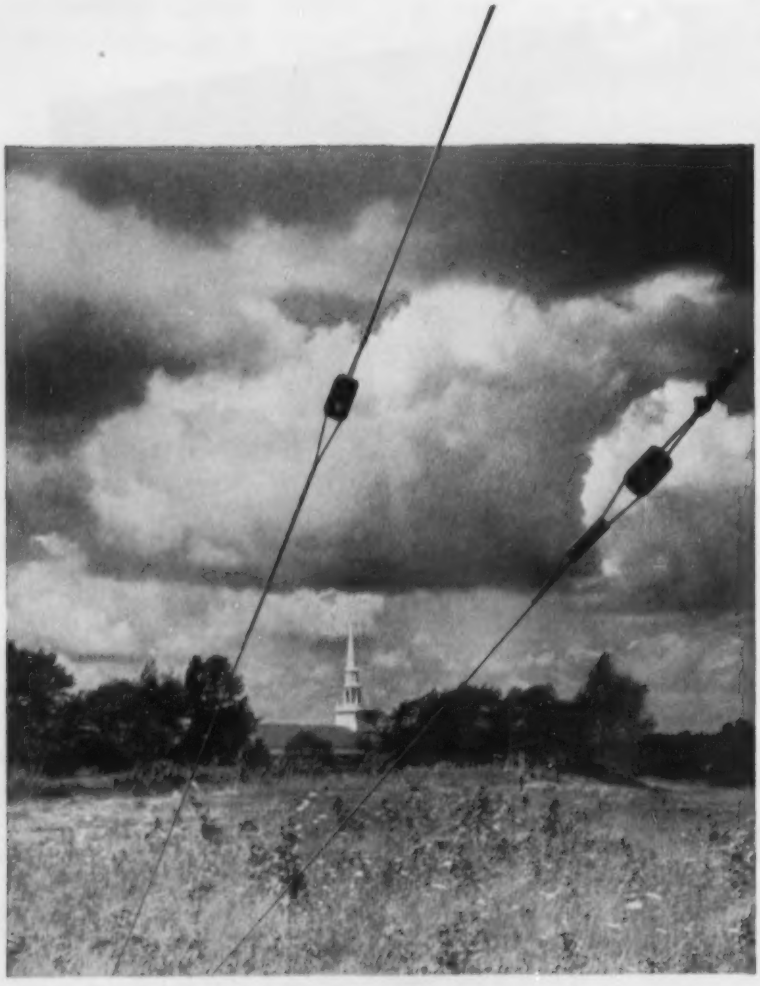

Guy-Grips*

BY PREFORMED

...Economical

...Neat

...Efficient

*at the left

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FEATHER RIVER LICENSE GRANTED BY COMMISSION

A license for operation of three power plants on the north fork of California's Feather River was granted Pacific Gas and Electric Co. by the Federal Power Commission.

The projected plants are: Butt Valley, 36,000 kw; Caribou No. 2, 109,000 kw; and Belden, 113,000 kw. Cost will be $74,000,000.

PG and E is spending $113,000,000 to expand its Feather River system to 10 plants with total capacity of 746,800 kw. Work includes two concrete and steel diversion dams, 16½ miles of large bore tunnel, and Poe generating station, approved earlier.

Construction Activities

City Light at Seattle has asked the city council to appropriate $1,900,000 for installation of a fourth transformer bank at the Bothell receiving station and for construction of 28.8 miles of 115-kv transmission line from Bothell to Seattle. The projects are scheduled for this year.

Grant County PUD has awarded contracts totaling $172,497 for construction of a second-story addition to its office building at Ephrata, Wash. The project, including a new auditorium, is scheduled for completion Aug. 1. The PUD plans to ask bids soon for construction of an office, warehouse and auditorium at Moses Lake.

California Electric Power Co., Riverside, has budgeted more than $11,500,000 for construction and modernization of transmission, distribution and generating facilities during 1955. One budget item is $375,000 for purchase of a site for a planned $18,000,000 steam plant.

Bonneville Power Administration plans a $1,925,000 substation west of Portland, Ore., for delivery of energy from The Dalles Dam, currently under construction. The sub is scheduled for energizing in October 1956.

Santa Clara city councilmen have approved purchase of three 500-kva transformers for expansion of the city's electric system. City officials are authorized to call for bids.

Southern California Edison's Alamitos steam plant construction was officially launched in February with ceremonies at the plant site. Civic leaders and company officials attended.

Grays Harbor PUD, Aberdeen, Wash., has increased allocation for line construction this year to $403,746.

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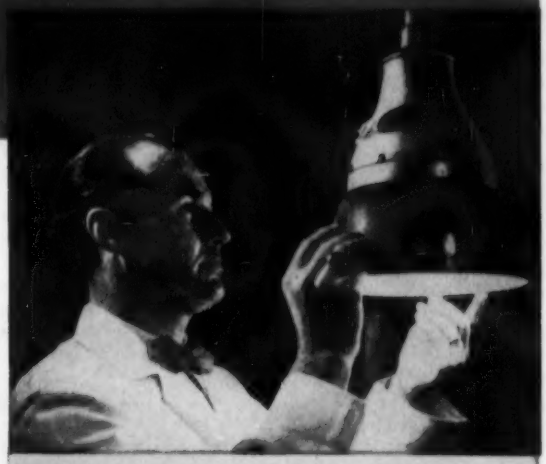
Products are constantly tested to make sure that they are being made to withstand field conditions. New devices are tested to predetermine their meeting or surpassing the requirements of Underwriters' Laboratories.

The photographs at the right show three of the many testing operations that are done in the Electrical Laboratory. It is equipped with apparatus for making both alternating and direct current tests, heat tests, pressure tests and many others.

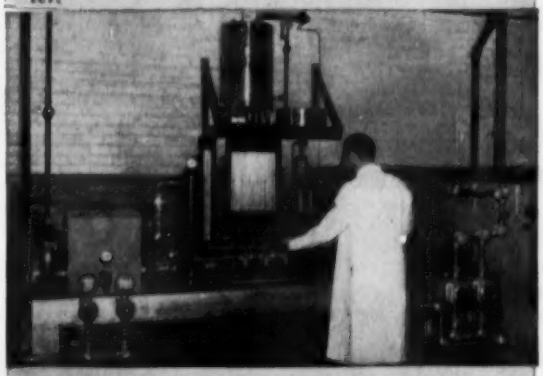
Close cooperation between Crouse-Hinds laboratories and manufacturing departments is one of the reasons why Condulets have been the "Standard of Quality" for nearly fifty years.

Specify CONDULETS on every job. They're made right ... to serve you better ... and last longer.

When quality counts
... you can count on Condulets



Probing for maximum exterior operating temperature on a Type EVA Explosion-Proof Lighting Fixture using a multiple point recording potentiometer.



Adjusting carburetors and flow meters to create a predetermined explosive mixture within an explosion-proof Condulet for an explosion test.

Photographing the pressure wave in the Oscilloscope to determine the maximum explosion pressure within an explosion-proof Condulet that is behind the concrete wall.

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OUTLOOK DIM ON PASSAGE OF INTERSTATE COMPACT

The Columbia Interstate Compact Commission proposal, now in the legislative hoppers of Congress and the states concerned, is drawing opposition from some quarters and delay from another.

In Washington the Seattle Chamber of Commerce has asked for an interim committee study instead of ratification during the current session of the legislature.

Oregon public power proponents have selected the compact's power allocation clause for a battleground. They are saying the state will lose its fair share of Pacific Northwest hydro generated electricity under water and power allocation provisions.

Portland Chamber of Commerce is on record with a statement calling the compact "a distinct forward step which does not give away any rights the state now has."

Lined up with supporters of the compact in Oregon are: Engineers for Private Enterprise Inc., Oregon Farm Bureau Federation, Portland General Electric, Pacific Power & Light and Portland Chamber of Commerce. Opposing are PUDs, REA Co-ops, the AFL, CIO and Grange and Farmers Union organizations.

College Contracts with G-E For Nuclear Research Study

General Electric Co. has announced it will enter into a contract with Washington State College, Pullman, to study the installation of a nuclear research reactor at the institution.

R. D. Eldred, sales manager for the company's power equipment component, said the contract will be the first phase of an over-all program designed to have a reactor working at the college within two years.

Harold M. Dodgen is director of the nuclear reactor project for the college.

Christensen Tells Analysts Financial Picture is Good

Kenneth C. Christensen, treasurer of Pacific Gas and Electric Co., told San Francisco security analysts that his company should realize a gross revenue increase of about 9% during 1955. He spoke at a luncheon Feb. 3 at the St. Francis Hotel.

Christensen said his statement was based on the results of 1954 business which surpassed all previous years in the company's history, and which terminated after a definite "upturn" in the final quarter of the year. He reported that the stimulated business in the final months of 1954 is continuing in the current year.

Included in his talk was the information that PG and E has raised more than a billion dollars by security sales in the postwar period.

Closed-Circuit Television Gives View of River Bed

Inspection of the Columbia River bottom at The Dalles Dam is being done with closed-circuit television, according to Lt. Col. David S. Parker, acting Portland district manager.

The robot-controlled camera, owned by Francis J. Maiken, Commercial Divers Inc., Portland, travels on the river bed and relays an image of it to observers above.

Westerners Participating In 17th Power Conference

Several Western utility and associated industry men are on the program of the 17th annual American Power conference, scheduled for March 30 through April 1 at the Sherman Hotel, Chicago.

Harold Quinton, president of Edison Electric Institute and of Southern California Edison Co., is luncheon speaker the first day.

E. L. Kanouse, assistant engineer of construction and design for the Los Angeles Department of Water and Power, will speak on area studies and the prediction of load growth in a session March 31.

Frank J. Lockhart, Jack M. Whitesell and A. C. Catland of the Fluor Corp., Los Angeles, are teamed up to talk on the subject of cooling towers for the power industry.

Russel C. Alexander and Jack Korenthal, both of the Los Angeles Department of Water and Power, will talk on centralized control of boiler and feedwater chemical treatment of the Valley steam plant.

John F. Sullivan Jr., president of the Western Society of Engineers, is luncheon chairman the final day.

Chauncy Starr of North American Aviation is featured with a talk on the sodium reactor power plant in a nuclear technology session April 1.

Eugene C. Starr, chief engineer of Bonneville Power Administration, is associate chairman of a session on computers and network analyzers.

The program is arranged to cover practically every phase of the electric industry, including atomic energy as related to the industry.

PUGET SOUND UTILITIES CONTRACTING WITH AEC

Puget Sound Utilities Council of Seattle has agreed to terms of a contract with the Atomic Energy Commission for a study on commercial production of atomic power.

Composed of Seattle City Light, Tacoma City Light, Puget Sound Power & Light Co. and the Snohomish and Chelan County PUDs, the council will spend $100,000 a year on the study, according to Jack Stevens, its consulting engineer.

PG and E Offers Partnership For Trinity River Project

Pacific Gas and Electric Co. has made a formal proposal to the U. S. Bureau of Reclamation for partnership construction of the Trinity River project in California.

The company's offer is to build the power generation and transmission facilities and to pay the government $3,500,000 a year for the use of falling water developed by the project.

Details of the proposal were stated in a letter from N. R. Sutherland, vice-president and general manager of PG and E, to C. H. Spencer, Region 2 director of the U. S. Bureau of Reclamation. The letter restates an offer made at a hearing before the subcommittee of the House Interior and Insular Affairs committee at Redding last April.

According to Sutherland's letter, additional revenue to the government over the project repayment period would amount to $171,000,000 under the partnership agreement.

Simplified Rate Schedule Effected by Colorado Firm

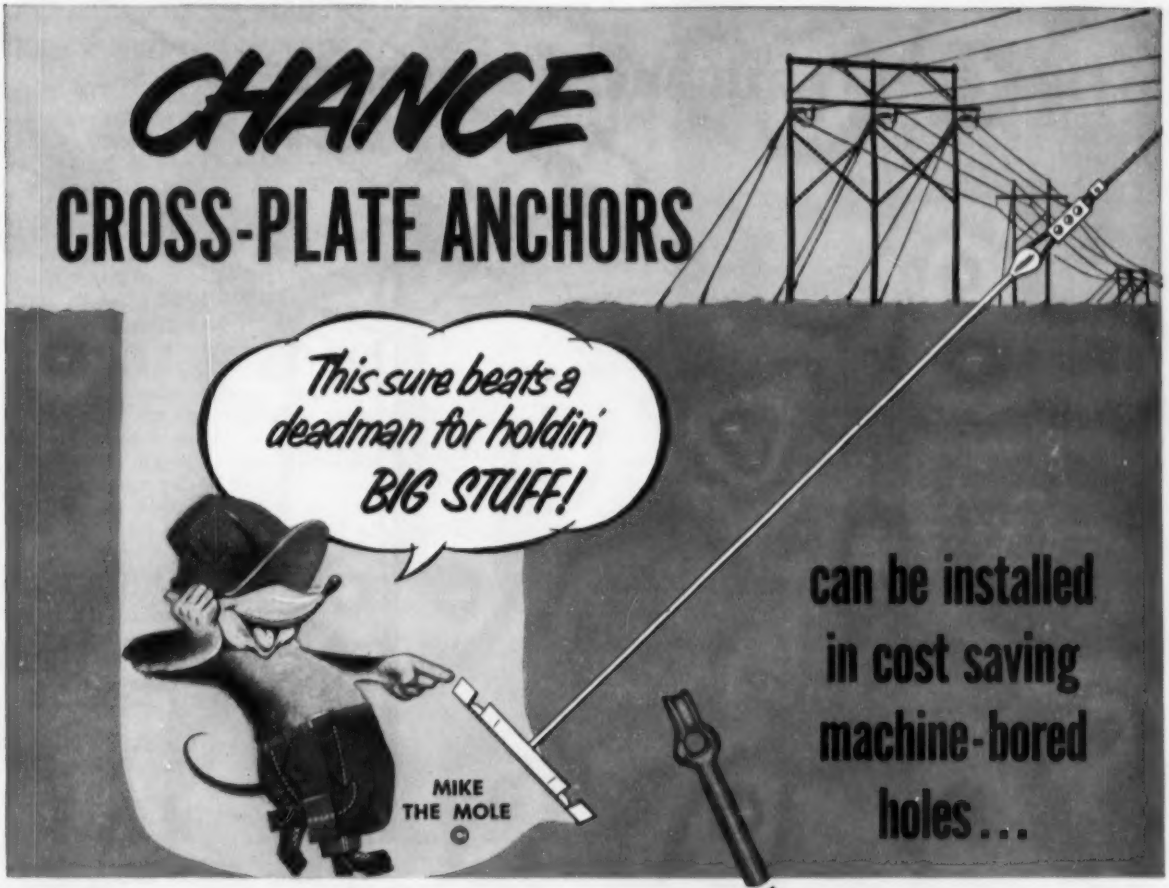
Public Service Co. of Colorado put a new simplified rate schedule in effect Feb. 1 after receiving approval from the Colorado Public Utilities Commission.

Action to standardize rates was started after voters gave the PUC ratemaking authority over all the state, taking away home rule city rate regulation.

Included with the standardization move is an increase of about $1,530,000 authorized by the PUC Dec. 17 when the company's rate of return was fixed at 6%. It affects 75 Colorado cities.

Simplification reduced 32 rate schedules to nine and is only the first step in the company's rate standardization move.

CHANCE
CROSS-PLATE ANCHORS



Give the Guy a CHANCE

When you're guying "big stuff," like transmission lines, you want an anchor that will hold the load for the life of the line. Not only will a CHANCE Cross-Plate Anchor stay put under really heavy loads, it will enable your company to cut installation costs in half.

In a typical test conducted under laboratory conditions, a CHANCE Cross-Plate Anchor held a load of 70,000 pounds with only a slight distortion, while the maximum load reached before a creosoted log began to split was only 20,000 pounds.

With the CHANCE Cross-Plate Anchor, whether you bore vertically or diagonally—*only one* hole is necessary ... and *all* the boring can be done by machine. Log deadmen require a trench—and digging a trench takes *hours* of manpower. You also save truck and storage space. One man can handle two Cross-Plates, but it takes two to handle a deadman ... so save your company time, labor and dollars. Use CHANCE Cross-Plate Anchors on your "big stuff."

Nut retainer prevents the anchor from riding up the rod as it is placed in the hole.

ABC INDUSTRIES

A·B·CHANCE CO.

CENTRALIA, MISSOURI
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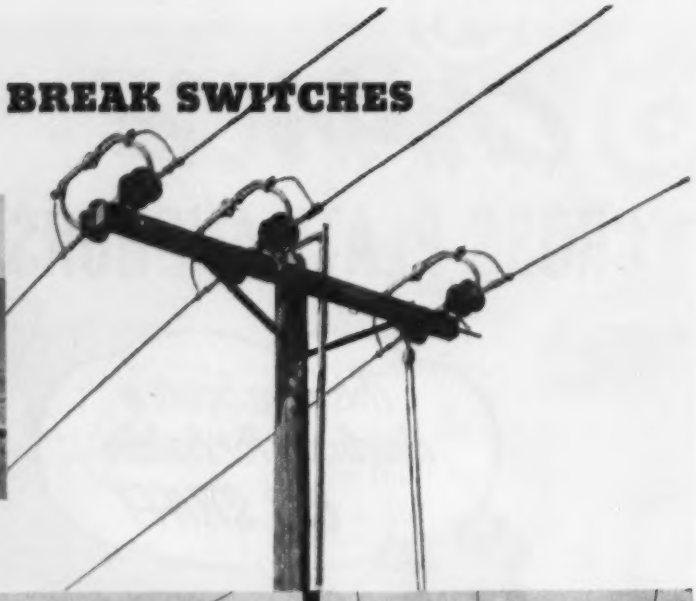
CHANCE Cross-Plates are available in a range of sizes from 150 to 400 square inches. There is a CHANCE Anchor Distributor near you who can probably fill your order directly from stock.

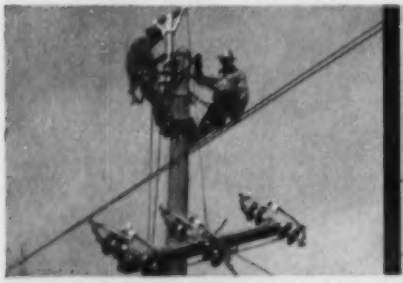
SPECIFY CHANCE FOR SERVICE!

CAS4-15

KPF AIR BREAK SWITCHES

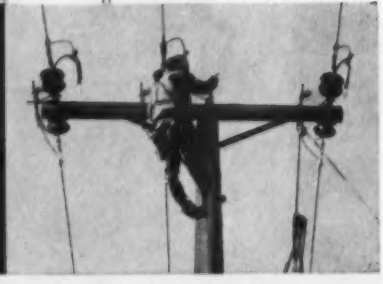
1 Sturdy factory-assembled phase units are bolted to cross-arm and push-pull interphase control rods installed on the ground. (Installation is equally simple in the air on installed cross-arms.)





2 At pole top, lineman receive switch bolted to cross-arm and ready to install on pole. Simple design and use of quality materials means KPF phase units are rugged, yet amazingly light weight.

3 Cross-arm bolted to pole, braces and first section of control rod installed. Linemen connect conductors quickly and easily to any standard strain clamp and dead-end direct to phase units.



4 Conductors connected, crank arm being adjusted on push-pull interphase control rod. Like KPF switches and Quick-Breaks, KPF controls need no lubricating. They crack off any icing, are never affected by cross-arm warpage.

Time-tested KPF switches install simply, easily—in 1/2 normal time

KPF switches—the switches that look different because they *are* different—install differently, too. Experience of leading Western power companies shows that KPF switches are normally installed in ½ the time required for complex, cumbersome ordinary equipment. Each KPF phase unit is light weight, readily handled by one man. No extra cross-arms or special supporting structures are needed. Each phase unit is fully assembled, tested and adjusted at the factory. The unit is ready to operate when it reaches the job—no waste of lineman's time. Dependable KPF switches may be mounted horizontally, vertically or triangularly with equal success and long-term, trouble-free service.

For the world's simplest, surest, lowest cost air break switch, specify KPF—standard for nearly 50 years.

KPF
AIR BREAK SWITCHES
Standard for nearly half a century

New catalog gives complete specifications, detail drawings, installation data.

5 Installation complete. Lineman installs operating lever and last section of control rod. Note the neat, clean pole top appearance of KPF switches—a familiar sight throughout the West on such famous systems as PG&E, Southern California Edison and others.

KPF ELECTRIC COMPANY
1624 East Alpine Avenue, Dept. W, Stockton 5, California

IRRIGATION GROUP PLANS TWO HYDROELECTRIC UNITS

Elk Grove (Calif.) Irrigation District is requesting a preliminary permit for a hydroelectric project, according to Federal Power Commission information.

Four developments, called Big Bend, Poverty Bar, Marshall and Salmon Falls, would be located on the north, middle and south forks of the American River in El Dorado and Placer Counties. Energy from two generating stations in the project would be sold at wholesale to either Pacific Gas and Electric Co. or Sacramento Municipal Utilities District, the application states.

A preliminary permit, if issued, gives the holder priority while conducting necessary surveys and investigations to prepare an application for an FPC license. No construction is authorized.

Bids and Contracts

• **Bids for three** 103,300-kva transformers to be installed in the Chief Joseph Dam power house on the Columbia River at Bridgeport, Wash., have been called by the Corps of Engineers. They are to be opened April 1 in the corps district office at Seattle. Proposals for six 67,368-kva generators for the project now are under consideration, with the English Electric Export & Trading Co. of England low at $5,460,361.

• **Imperial Irrigation** District, El Centro, Calif., called for bids Feb. 15 for construction of intake works, power house and substation for Pilot Knob hydroelectric generating plant. Bids are to be opened at 10 a.m. March 29 at the district's El Centro offices.

• **Gough Industries** Inc., Los Angeles, was low of 23 bidders to supply three schedules of wire for The Dalles Dam. Corps of Engineers reports the three low bids were: $42,540, $60,023 and $59,702.

• **Snohomish County** PUD of Everett, Wash., has ordered nine transformers from the General Electric Co. for $118,233. Three 500-kva transformers will be installed in the Arlington substation and three each 2,500-kva units in proposed substations at East Stanwood and Mountlake Terrace.

• **J. H. McRae** Co. Ltd. has been awarded the electrical contract for a new building at Vancouver for the Greater Vancouver Water District. The company is also building a new office and garage for Yellow Cab Co. Ltd.

Specify ANDERSON Aluminum CONNECTORS

For WIDER APPLICATION on Aluminum Distribution Systems

These Anderson Connectors will eliminate the large assortment of types and sizes you are now using — *and still give you a wider range of application.* They save costs . . . reduce truck inventory . . . save time on the job.

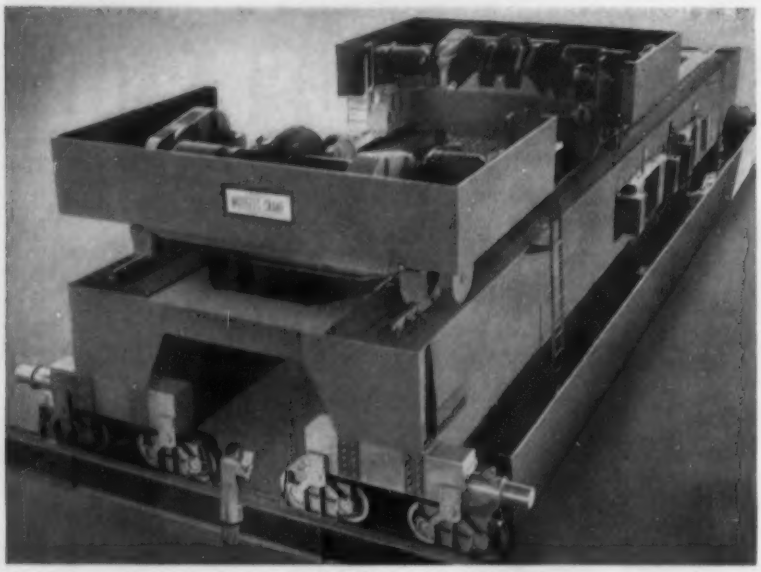
ABW DESIGN means quality Plus strength in the Right Places!

CAT. NO.	MAIN	TAP
LC-51A	No. 6—1/0 ACSR	No. 6—No. 2 ACSR
LC-52A	No. 6—1/0 ACSR	No. 6—1/0 ACSR
LC511A	No. 6—1/0 ACSR	No. 8—No. 2 Copper Cable
LC-522A	No. 6—1/0 ACSR	No. 8—1/0 Copper Cable
LC-70B	No. 6—No. 2 ACSR	No. 6—No. 2 ACSR
LC-71B	No. 6—1/0 ACSR	No. 6—1/0 ACSR

For more complete information consult your nearest ABW representative or contact our home office.

Aluminum & Bronze POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES for SUBSTATION • TRANSMISSION • DISTRIBUTION SYSTEMS *for over a Quarter Century*

ANDERSON BRASS WORKS INCORPORATED BIRMINGHAM, ALABAMA



OVERHEAD CRANES — ⅛ to 650 Tons

Shop fitting a MOFFETT overhead crane built for the power house at Garrison Dam. Two of these huge machines will work together to handle loads up to 600 tons. Complete and careful shop assembly and coordination of deliveries to your erection schedules insure easy, confusion-saving installation on the job. For a "plant individualized" crane, consult MOFFETT NOW!

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Now ready, as a kit, to fit any regular model on the job. Simple to change. Saves time—Saves money.

ON AT SUNSET—OFF AT SUNRISE or a fixed time, 10:30 p.m. to 1:30 a.m.

• Tork Time Switches require no attention—this feature $12.00. A must on all public safety lighting. An economy on all commercial lighting. Tork is fully automatic. No one forgets.

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This great standard reference work for all in the electrical engineering profession and all whose work touches on this field brings a handy compilation of practical, usable data from all fields of electrical engineering practice, plus the most frequently required fundamental theory, units, and systems of measurement, made dependable by the work of 101 engineers, scientists, and other authorities.

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26 big sections cover wide range—from electricity in aviation and air conditioning to power transmission, illumination, electronics, and scores of other fields—plus giving data on recent developments in magnetic materials, insulations, radar, servo-mechanisms, induction, dielectric heating, etc.

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CIO COMMITTEE SUPPORTS FEDERAL POWER PROJECTS

Members of the CIO's Committee on Power, Atomic Energy and Resources Development decided in Denver to support federal development of Hells Canyon and the Frying Pan-Arkansas diversion project. The committee is also going to "reconsider" former opposition to the Echo Park Dam, key unit of the Upper Colorado River storage project.

• **The Montana Senate** has killed a memorial calling for immediate construction of Libby Dam.

• **City Light** of Tacoma has filed a condemnation petition against 317 acres needed to construct a road to Cowlitz Dam at Mayfield.

Tax Bills

Colorado's Legislature has received two bills that would require utilities to pay all or part of the expense of their regulation by the State Public Utilities Commission. Regulation expense of the coming fiscal year is estimated at $150,000. One bill, drafted by the Colorado Municipal League, asks for all regulation expense. A second asks for 75% of PUC costs.

Washington legislators are considering a sales tax package that would amount to about $18,000,000 revenue. One provision calls for extension of the present 3% sales tax to include utility bills; another would apply the tax to contractors of federal projects. An earlier proposal doubling the tax on utilities was abandoned. Commented the House tax committee chairman, it would be "as bad as a poll tax or a tax upon bread."

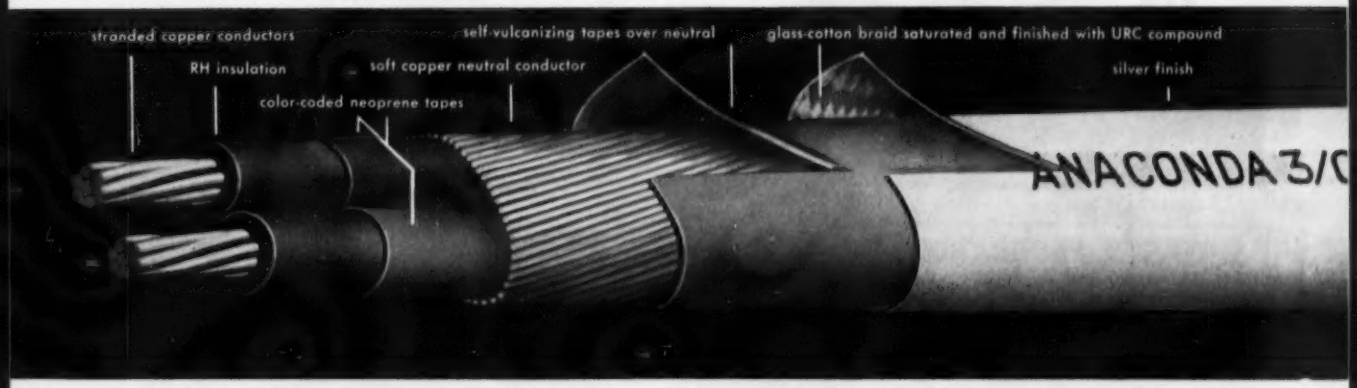
Arizona's House of Representatives has two measures that seek new revenues by the property tax route. The first would require the tax commission to assess public utilities at full cash value; the second requires the corporation commission to use the same evaluation for rate purposes.

Washington PUD revenues would be taxed three times more than at present with passage of a measure before the legislature. An excise tax on PUD gross revenue from sale of electric energy obtained from sources other than a PUD would be increased from 2 to 6%. The tax on the gross from sale of electric energy generated by the PUD or purchased from another PUD would be raised from 5 to 15%. The money would help support public schools.

ANACONDA ANNOUNCES—NEW

SILVALINE 100-AMP service entrance cable

The *only* SE cable with URC† saturant and finish



Here's a new Underwriters Type SE service entrance cable that complies with NAHB Voluntary Adequate Wiring Code . . . and will help you boost kwhr sales.

The new Voluntary Adequate Wiring Code of the National Association of Home Builders calls for 100-amp service into the home.

Adequate capacity in service entrance for homes insures your future sales of electrical energy – because it removes the *initial* bottleneck to the sale of high-current appliances.

And now, Anaconda introduces the new Silvaline* 100-AMP (actually 115-amps) TYPE SE cable. Made with #2 AWG copper – and Type RH insulation.

Here are other advantages:

Uninterrupted Service. *Silvaline is the only service entrance cable with URC† saturant and finish* . . . will not festoon or deteriorate. URC weatherproof protection will stay put – assures long life operation and eliminates trouble calls.

Eliminates Complaints: Silver finish on Silvaline takes any type or color of house paint . . . won't bleed through. Will not flake or peel. No complaints from homeowners when Silvaline is used.

Silvaline 100-AMP cable is now available. For more information, contact your local Anaconda representative or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 56311B

*Reg. U.S. Pat. Off. †Utilities Research Commission

SILVALINE service entrance cable

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QUICK SERVICE FOR GROWING WEST – *Anaconda's integrated plant at Orange, California, assures western industry of quick, sure service on wire and cable for every kind of application. Contact Anaconda Sales Office at: Los Angeles, San Francisco, or Seattle.*

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STEEL & WIRE COMPANY
MUNCIE, INDIANA

NEWS ABOUT PEOPLE

• L. W. "Ted" **Coughlan** has been appointed comptroller of Pacific Gas and Electric Co. He succeeds **E. W. Hodges** who retired at the end of 1954 after being comptroller for 27 years. Coughlan began his career with PG and E in 1916 as a clerk in Nevada City. He has served in various auditing and accounting posts, was chief clerk in the San Francisco general office auditing department for 11 years and general auditor for three years. He was made assistant comptroller in 1954. Hodges joined the company's auditing department in 1917, became general auditor in 1921 and had been comptroller since 1927.

• **Garland B. Childers,** staff engineer for Johns-Manville in the San Francisco area, has been appointed to the newly established position of general construction superintendent of the company's industrial products division. He moves to New York. Childers is a graduate of Kansas State College and the Navy Post Graduate School, Naval Architecture, University of Michigan. He served with the U. S. Naval Reserve during World War II.

• **James F. Pollard** has joined the Davey Tree Surgery Co. Ltd. as manager of the utility division for the Western states according to Keith L. Davey, president. Pollard recently retired as commercial manager of Pacific Gas and Electric Co. Prior to that he had been president of Seattle Gas Co. and vice-president and general manager of Coast Valley Gas & Electric Co.

• **C. J. Carter,** San Francisco branch manager for Line Material Co., has been appointed to the position of fiber products sales engineer. From his new headquarters in Spokane, he will cover Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, part of Nebraska and Alaska.

• **Edwin G. Nielsen,** Bureau of Reclamation regional director at Boulder City, Nev., has been appointed assistant commissioner of reclamation for irrigation and power. He succeeds **Harvey F. McPhail** who retired recently from the commissioner's staff in Washington.

• **D. Owen Nicholson,** formerly of Mine & Smelter Supply Co. of Salt Lake City, is now with the Anaconda Wire & Cable Co.'s Los Angeles sales office.

Coughlan

• **Waldo Porter,** chief electrical engineer at Aluminum Co. of America's Vancouver, Wash., works since 1949, has been appointed to a newly created post of power manager for Alcoa's Northwest operations. **W. E. Lawton** will take over Porter's former position. Porter has been with Alcoa since 1936 and went to Vancouver in 1940. Lawton was in Vancouver in 1940 and 1941 and then was in Pittsburgh and Wenatchee before returning last September.

• **L. G. Berger** is the new Western regional manager of apparatus and supplies for Westinghouse Electric Supply Co., Los Angeles. He was formerly Pacific regional manager of consumer products. **M. B. Sauer** will succeed Berger as Western regional manager of consumer products, with headquarters in San Francisco.

• **Walter H. Thompson,** retired assistant general lamp sales manager for Westinghouse Lamp Division, was honored by fellow employees at a dinner Dec. 30. Before being named to his national post six months ago, Thompson was Pacific Coast regional manager for 12 years. He has been active in West Coast lighting and civic organizations.

• **Orren Brownson,** assistant to Bonneville Power Administrator William A. Pearl since last June, has left BPA to return to private business. He has purchased a beer-wine distributorship in Portland and took over management of the firm Jan. 1. Brownson was general manager and vice-president of McDonald Candy Co. before he joined BPA.

• **Dr. Jerre D. Noe** has been named assistant director of engineering research at Stanford Research Institute by Thomas H. Morrin, director of engineering research.

VICTOR "KNOW-HOW"

Plus

Purified Porcelain

...Give You America's Finest Pintypes!

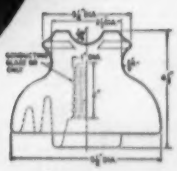
VICTOR Low Voltage Pintypes are the result of the combined "know-how" acquired through ceramic, electrical and mechanical research.

VICTOR Pintypes are made of *Purified* Porcelain, finest insulator porcelain ever made! They are designed with rugged cross section for maximum strength and resistance to impact. They have large-radius top and side wire grooves to permit use of new larger conductors, and smooth hard glaze for maximum self-cleaning in contaminated areas. Every insulator is thoroughly tested to assure continuity of service.

VICTOR Pintypes last longer, cut line maintenance costs to a minimum. You'll save money by specifying VICTOR.

FEATURES

1. **PURIFIED PORCELAIN** provides highest dielectric and physical strength.
2. **RUGGED CROSS SECTION** gives maximum strength and resistance to impact.
3. **RESEARCH-ENGINEERED DESIGN** minimizes outages.
4. **LARGE-RADIUS TOP AND SIDE WIRE GROOVES** permit use of new larger conductors.
5. **MECHANICALLY APPLIED GLAZE** results in high strength with smooth, self-cleaning surface.
6. **ACCURATE PINHOLE GAUGING** —every lot must pass NEMA standards for pinhole thread accuracy.
7. **ROUTINE ELECTRICAL FLASHOVER TEST** is given every pintype before shipment.



Specifications

60 cycle Dry Flashover	70 KV
60 cycle Wet Flashover	40 KV
Pos. Impulse Flashover*	110 KV
Neg. Impulse Flashover*	140 KV
Dry Arcing Distance	5"
Leakage Distance	9"
Rec. pin height	5"
Cantilever Strength	3000 lbs.
Low Freq. Puncture Voltage	95 KV
RNI (plain)	5500 microvolts
RNI (radio-freed)	50 microvolts
1000 KC at applied KV	10 KV

*Crest KV. 1½ x 40 microsecond wave Critical Value

For the full facts on Victor "Know-how", write for "The Story of Victor and Purified Porcelain." For engineering data on Victor insulators, write for Bulletin No. 4.

NEWS FROM VICTOR

Shown in the drawing above are the control panel and Oscillograph for the impulse generator in the Victor electrical laboratory. This equipment is being used to study the effects of high surge voltages on both present and projected insulator designs.

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Purified Porcelain Pintypes

VICTOR INSULATORS DIVISION
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Low and High Voltage Pintypes • Suspensions • Guy Strains
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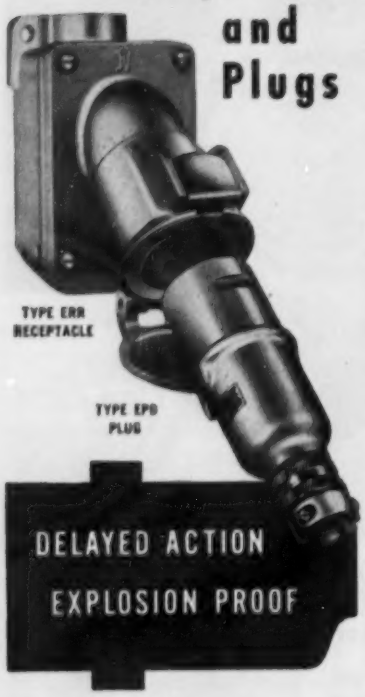

...are safe, reliable connectors for portable electrical equipment in hazardous locations, (Class I, groups C and D) and also are safe and positive current rupturing devices.

The delayed action lock, which is extremely easy and simple to operate, makes it impossible to open or close the circuit except when the contacts are safely confined within the explosion-proof chamber. Pressing a conveniently-located button is all that is necessary to release the delayed action lock. The plug is inserted and withdrawn in a straight line. No turning is necessary. No separate sealing fittings are required. For 15 and 30 ampere, 2-wire, 3-pole and 3-wire, 4-pole circuits.

Sold nationally through electrical distributors. Write for detailed literature.

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CONDUIT FITTINGS • FLOODLIGHTS

Californians To Attend Administration School

Three Californians are among 13 Westinghouse men slated to take a 16-month course in business management at the Harvard graduate school of business administration.

The three are: H. J. Cabral, engineering section manager, Apparatus Division, Sunnyvale plant; F. M. Ogden, sales engineer, Apparatus Division, San Francisco; and M. D. Simonson, sales engineer, Apparatus Division, Riverside.

• **Robert Garen** and **Bill Dugovich** have been appointed aides to Dean Barline, public utilities director at Tacoma, Wash. Garen, named as administrative assistant, has been property manager for the utilities the past year. Prior to that he was manager of Coulee City for the Bureau of Reclamation. Dugovich, recently with the U. S. Department of State, became public information officer.

• **Raymond K. Leonard** has been appointed manager of the South Pacific lamp sales district for Westinghouse Electric Corp., it was announced by George B. Mackey, manager of the Lamp Division Pacific Coast region. His district includes southern California, Arizona and Las Vegas, Nev. Leonard comes from Dallas, where he has been manager of Texas district sales.

• **O. Biedermann** has been appointed general manager of Pacific Oerlikon Co. at Tacoma, Wash., replacing **Lloyd Morgan**, who is no longer with the company.

Deaths

• **Carl E. Gieseker**, 60, treasurer of Washington Water Power Co., died recently at his home following a heart attack. He joined WWP 43 years ago as a commissary clerk on the Long Lake construction project. He was a clerk in the firm's Big Bend division until 1918 when he became clerk in the general accounting division in Spokane. He was promoted to chief clerk in 1924, auditor in 1935 and became treasurer in 1942.

• **Emil V. Olson**, 63, safety supervisor for Washington Water Power Co., died after a brief illness. Born in Sweden, Mr. Olson came to the United States in 1901 and to Spokane in 1910. Mr. Olson was also photographer for the company for many years and a frequent lecturer on safety in eastern Washington and northern Idaho.

FOR SALE

1, 2000 Amp. switch in weatherproof enclosure, 575 volt, 3 phase, AC, at transformer bank. 80', 2000-Amp. 575 volt, 3 phase, AC, weatherproof feeder bus to building, National Electrical Products Manufacturers. 50', 2000 Amp. distribution bus, inside building, 575 volt, 3 phase, AC, National Electrical Products Manufacturers. 120', 600 Amp. plug in bus duct, 575 volt, 3 phase, AC, National Electrical Products Manufacturers. 460', 400 Amp. plug in bus duct, 575 volt, 3 phase, AC, National Electrical Products Manufacturers. 1, 600 Amp. I. T. E. bus duct feeder, breaker switch. 1, 600 Amp. I. T. E. breaker switch. 4, 400 Amp. I. T. E. bus duct feeder, breaker switch. 1, 275 Amp., I. T. E. plug in duct, service breaker. 1, 175 Amp., I. T. E. plug in duct, service breaker. 1, 125 Amp., I. T. E. plug in duct, service breaker. 3, 90 Amp., I. T. E. & Westinghouse, plug in duct. 1, 70 Amp., service breaker switch. 2, 50 Amp., service breaker switches. 2, 35 Amp. service breaker switches. 1, 20 Amp., service breaker switch. 23, 15 Amp., serice breaker switches. 2, 10 K. V. A. dry type transformers, 440 volt to 240/120 volt. 1, 15, K.V.A. dry type transformer, 440 volt to 240/120 volt.

Business phone 31383, Ext. 13
Home phone 28704, Reno

S. F. HATFIELD, Electrician
c/o VAUGHN MILLWORK CO.
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PROTECT RUBBER GLOVES BETTER with WICX Covers!

Give better protection to lineman's rubber gloves. Wicx imported goatskin covers repel water and grease. Will not tear or peel. Dry soft and stay soft.

Widely used by utilities and electrical contractors since 1940.

Write for free catalog.

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LARGEST EXCLUSIVE MANUFACTURERS OF METER TESTING DEVICES

SWITCHES
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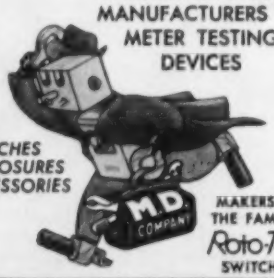


MAKERS OF THE FAMOUS Roto-Test SWITCHES

METER DEVICES
COMPANY • CANTON, OHIO

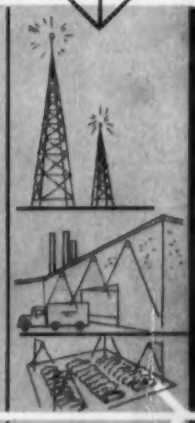
FISHER-PIERCE PHOTOELECTRIC CONTROLS

for every lighting system requirement

The extreme versatility and quality of Fisher-Pierce photoelectric lighting controls is evidenced by their widespread use over the past eight years, in controlling hundreds of street lighting systems . . . aircraft obstruction and beacon lights . . . outdoor signs and store window lights . . . parking, loading and storage area lights . . . poultry house and roadside telephone illumination, etc. All Fisher-Pierce controls employ a basic circuit whose dependability, ruggedness and trouble-free performance have been proven in use.

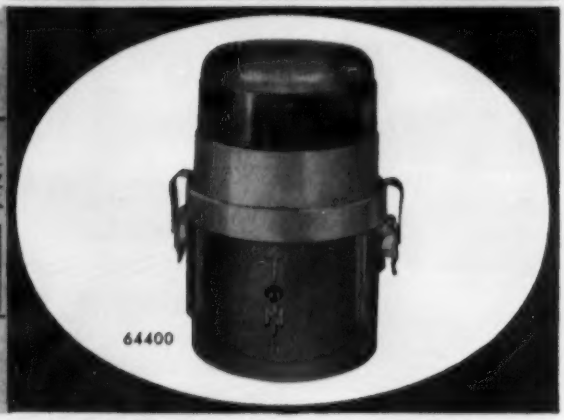
SERIES 63300C CONTROLS

Rugged, easily installed, accessible units for switching up to 3000 watts of lighting load. For operation at 105-130 or 210-250 V, 50-60 cycles. Standard models come with SPST, SPDT, or DPST power contactors. Special models are available with a switching capacity of 6000 watts. The electronic chassis is enclosed in a weatherproof watt-hour meter case assembly which plugs into a standard meter socket. The new 63300C design represents the results of eight years' extensive, specialized experience in the field.



SERIES 64400 CONTROLS

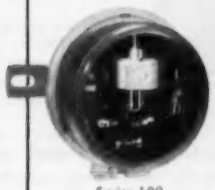
Small, compact, low cost units for switching 1000 watts of incandescent, mercury or sodium vapor lamps at 120 V, 50-60 cycles. Designed for use as an integral part of various manufacturers' luminaires, as well as for ballast, pole top, cross arm, standard and other mountings. Low initial cost and low maintenance make the use of one Series 64400 control per lamp economically practical for new street lighting installations and isolated locations.



THE ***nitelighter***

. . . for automatic control of home lights

An inexpensive, compact, automatic control made especially for domestic use. Operates on 110 volts AC, switches up to 300 watts. Plug lamp to be controlled into NITELIGHTER plug, face "eye" toward window; living room, hall, garage lights, etc. go on at dusk, off at dawn automatically and without attention. You'll never come home to darkness. Protects the home when you're away. Get it at your dealer, or if he cannot supply you, send a check or money order for $15.95. A NITELIGHTER will be sent postpaid and insured.



Series 100

MULTIPLE RELAYS FOR SWITCHING LOW VOLTAGE OUTDOOR LIGHTING CIRCUITS

Fisher-Pierce multiple relays incorporate a maintenance-free mercury plunger relay conservatively rated to switch 30 amps. at 110-115 volts AC. Series 100 relay is housed in a standard meter case and is available with or without line and coil protective equipment. The low cost Series 200 (not shown) is housed in a weatherproof cast aluminum case. Both series are designed for outdoor use as pilot wire control or for cascading street lighting circuits. Available with normally open or normally closed relays.

Complete Specifications and Data Available on Request

THE FISHER-PIERCE COMPANY, INC.

43 Pearl Street, So. Braintree, Boston 85, Mass.

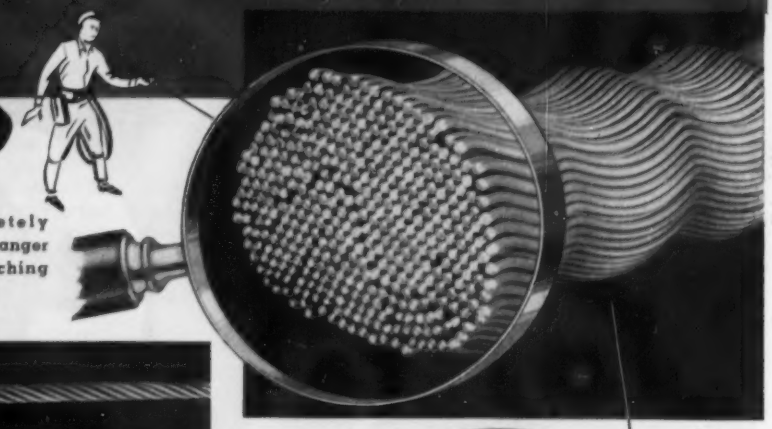
EXPORT: PHILLIPS EXPORT CORP. DIVISION OF NORTH AMERICAN PHILLIPS 100 E. 42ND STREET NEW YORK 17, N. Y.

IN CANADA: NORTHERN ELECTRIC CO., Ltd.

every good turn deserves another . . .

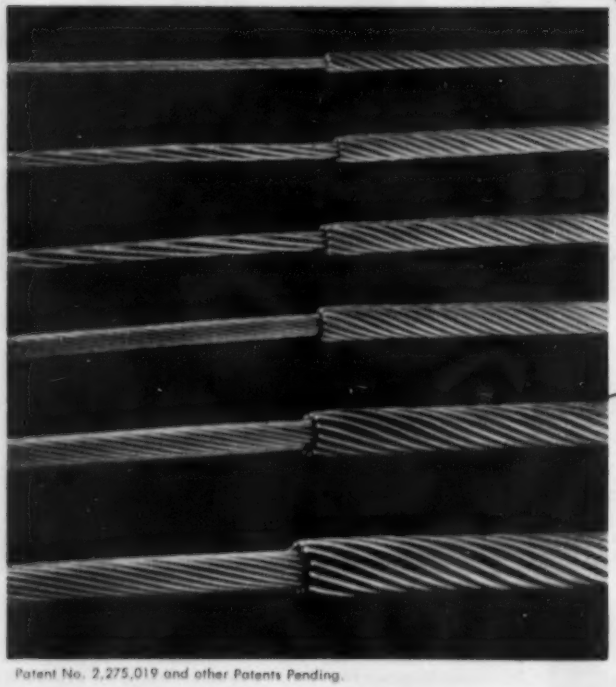
fine **FANNER** superformed **ARMOR RODS**

EXTRA QUALITY *here QUALITY COUNTS



*here

Exclusive end chamfering completely eliminates burrs and sharp edges. No danger of nicking conductors . . . or scratching linemen's hands.



Patent No. 2,275,019 and other Patents Pending.

*here

Exclusive forming method provides precisely formed rod contours, held to extremely close tolerances, and free of surface blemishes.

*here

Improved rod designs, tailored for easy application and made of high grade spring-type alloys, result in a tight grip and the elimination of "crowding."

*here

Wide range of sizes available for shipment from stock in improved packages. Only Fanner Superformed Armor Rods are protected along their entire length as well as ends.

Fine FANNER Superformed

With all these extra features (and more too), fine Fanner Superformed Armor Rods cost you no more than ordinary rods. Like all fine Fanner products, Fanner Superformed Armor Rods are outstanding in quality . . . based on sound engineering experience and over 50 years of manufacturing know-how. Write today to be placed on our mailing list.

THE FANNER MANUFACTURING CO.

BROOKSIDE PARK • CLEVELAND 9, OHIO

Established 1896

NOTES ON THE TRADE

New L-M Warehouses Opened To Serve West Coast Areas

Line Material Co. has announced the opening of two new sales offices and warehouses in the Western region.

Serving western Washington are new facilities at 1220 Nickerson St., Seattle, headquarters for C. A. Paynter, branch manager, and A. G. Simpson and P. B. Holden, field engineers.

In South San Francisco, Line Material is now located at 360 Shaw Road. This is the headquarters of W. T. Neikirk, district manager; E. M. Stites and E. J. Keogh, field engineers; H. T. Zamzow, apparatus engineer; B. V. Kunde, lighting engineer; H. C. Puls, fiber products engineer, and T. Frost, branch manager.

The modern quarters will permit a larger stock of equipment, better delivery and more efficient service, according to P. K. Churchill, manager of the West Coast Division.

Many friends of Maydwell & Hartzell gathered at the new offices and warehouses of the firm for an open house and buffet luncheon. Host was Harry F. "Pop" Hartzell, shown here in the entrance of the new building with S. J. Lisberger and W. P. L'Hommedieu, and some of the products of manufacturers represented. Address is 870 Tennessee, San Francisco

• **Roland K. Grannis** became vice-president in charge of sales, Pacific Utilities Supply Co., San Francisco, on Feb. 1, it was announced by **K. M. Ryals,** president. Among the lines distributed by this company are Preformed Line Products armor rods and guy-grips, Erico Products Cadwell process and Reynolds Metals aluminum conductor. Grannis replaced **Dale Evans,** who joined Preformed Line Products as West Coast manager.

• **Berko Electric Mfg.** Corp., producer of radiant glass electric heating panels, has announced the appointment of the Southwest Sales Co., 1620 E. Earll Drive, Phoenix, Ariz., as its representative for Arizona, New Mexico, Colorado, Nevada and west Texas. The company is headed by **H. J. Fender,** formerly a salesman with Mongerson Electric in Bakersfield, Calif.

• **Henry Coffee,** formerly president of Burton Equipment Co., is now associated with Gregory Electric Co., 6829 Rugby, Huntington Park, Calif. Originally Gregory manufactured transformers in San Diego, then became manufacturers' representatives. With this move to the Los Angeles area, it has returned to manufacturing.

• **H. C. Way,** former sales manager for the Northern Electric Co. Ltd. at Vancouver, B. C., has been appointed assistant district manager for the company in the B. C. area.

• **A. R. Parker** Co., San Francisco, is now manufacturer's representative for Swivelier Co. Inc. Territory to be covered by Parker Co. is northern California and most of Nevada.

• **W. S. Shamban** & Co., Culver City, Calif., is a new distributor of Teflon coated glass fabrics manufactured by E. I. du Pont de Nemours & Co.

• **Joslyn Pacific** Co. has opened a new warehouse at Salt Lake City. The new venture is being established for close supply to the intermountain area with pole line building and street lighting materials and all other products sold by the company.

• **Crescent** Co. Inc., announces that Adams & Payne, Los Angeles, will represent the Carol Cable Division of the company in greater Los Angeles and Arizona.

• **Walter H. Thompson** has been made sales manager, Western Transformer Division for Kuhlman Electric Co., with offices at 870 Tennessee St., San Francisco. He will coordinate relations between customers, salesmen and the recently acquired factory at Salinas, Calif. Thompson's territory will include the 11 Western states and the El Paso, Tex., area.

• **The John E. Elggren** Co. has been appointed sales representative for Penn-Union Electric Corp. With headquarters at 428 S.W. Temple, Salt Lake City, the company will cover Utah, eastern Nevada and western Colorado. Elggren has an electrical engineering degree from the University of Utah and was with Utah Power & Light from 1933 to 1941. Following military service overseas, he became a representative for manufacturers of electrical equipment.

• **William Forland,** former apparatus specialist for G-E Supply, Seattle, has left that company to go into business for himself distributing aviation equipment. **Ed Winters** takes his place at G-E Supply.

• **E. J. Baughman** Co. has moved to 1914 N. Cogswell Rd., El Monte, Calif. Manufacturers represented by the firm in the 11 Western states are: Bardwell McAlister Inc., Ponder & Best, Conrac Inc. and TV Specialty Co.

• **Henry T. Coffee** has been made president and manager of Burton Equipment Co. Inc. of South Gate, Calif., makers of transformers, coils, instruments and timers. **W. A. Rinehart** is first vice-president.

• **The F. Somers Peterson** Co., manufacturers' representative, has moved into new and larger quarters at 157 13th St., San Francisco. With offices in Los Angeles also, the company has been on the Pacific Coast for 43 years.

• **Buck Electrical Mfg.** Co. has appointed the following sales representatives in the West: Gaer-Florence & Associates, Denver; McLaughlin Co., Los Angeles; Standard Electric Sales, Seattle; Walter E. Wallace Co., San Francisco.

C. H. Kaufman, left, and Gordon Black, right, show at a San Francisco exhibit of Rome Cable Co.'s new EM tubing and conduit made at its new southern California plant how easy it is to pull wire through to Westinghouse salesmen Jessup, Buescher and Lane

• **Minneapolis-Honeywell Regulator** Co. has appointed **Wayne F. Kelly** as manager of its Spokane branch, replacing **George Dieter.** Kelly formerly was senior commercial salesman in Youngstown, Ohio.

• **Edward E. Nolan** has been appointed an engineering representative in the sales engineering department of the Lenkurt Electric Co.

• **Wholesale Electric** Ltd. is planning construction of new premises at Sixth Ave. and Burrard St., Vancouver, B. C. The company is at present located at 2205 Fir St., Vancouver. The new building will have 6,100 sq ft of space on its main floor and in its basement.

• **B. C. Transformer** Co. Ltd. is erecting a $120,000 plant at Madison Ave. and the Lougheed Highway in North Burnaby, B. C. The new company will engage in the manufacture of electrical transformers.

• **R. Harold Williams,** who has had 37 years' experience in the electrical engineering and construction fields, has been named president and general manager of the newly formed firm of Harold Williams & Associates, which has its headquarters at 661 Richards St., Vancouver, B. C. The company will act as sales engineers for power equipment and also engage in design and installation work.

• **Albert Jassim** has become president of Ruby Lighting, Los Angeles manufacturer, succeeding the late **Ben Ruby.**

• **Monarch Supply** Co., 277 Pennsylvania Ave., San Francisco, has been named a distributor for Allis-Chalmers motors and controls in nine California counties. Monarch is headed by **L. R. Burmester** and has a branch office in Santa Clara.

• **General Electric** Co. is building a $100,000 warehouse and distribution center for X-ray apparatus in San Leandro, Calif.

• **A diamond-studded pin** was awarded to **J. J. Hayes,** Pacific Coast regional treasury manager for Westinghouse Electric Corp., in recognition of 45 years of service.

• **The Electric** Corp. of California has moved to a new building and warehouse at 200 S. Mission Road, Los Angeles. The modern building covers 30,000 sq ft; has a rail spur and truck loading dock. Founded in 1908, the company is a distributor for Westinghouse and for Allen-Bradley motor controls.

• **United Transformer** Co. has established warehousing facilities for its line of transformers, filters and reactors at 1865 N. Western Ave., Los Angeles.

• **Kaiser Steel** Corp., Oakland, Calif., is publishing a new series of monthly semitechnical engineering reports entitled *Modern Designing With Steel.*

• **John Paul Jones** is Western zone manager for the Carol Cable Division of the Crescent Co. Inc. He will headquarter in Los Angeles.

Groundbreaking Ceremonies Launch Plant Construction

Groundbreaking ceremonies for an addition to the Sunbeam Lighting Co. plant in Los Angeles were held last month. According to Daniel Rashall, sales manager, the 26,000-sq-ft addition at 777 E. 14th Place will give a total of 100,000 sq ft.

It is planned to have a new painting system, tool and die and engineering departments as well as additional space for offices, parking, display. Specialized operations for various types of lighting installations will be accommodated.

The new addition is the third expansion in 10 years for Sunbeam, which is owned by Mac Bodian, Phil R. Freeman and Herbert L. Krieger.

• **Kaiser Aluminum & Chemical** Corp. of Oakland, Calif., has acquired a forging plant at Erie, Pa. Located on a 57-acre site, plant buildings cover 346,000 sq ft. Production facilities include die-producing and heat-treating facilities as well as drop hammers and presses.

• **Electrical Specialty** Co. has been appointed distributor in the 11 Western states of the Swedlow line of electrical laminate sheet stock made by Swedlow Plastics Co. of Los Angeles. Electrical Specialty has offices in San Francisco, Seattle, Los Angeles and Denver.

• **Joseph P. Bradshaw** moves to Portland to be a district sales manager for the Industrial Truck Division of Clark Equipment Co. He will work with J. I. Beicher, San Francisco, Western region sales manager. Bradshaw was a salesman for the Ross Carrier Co. nine years before its merger with Clark Equipment. He then joined Equipment Distributors Inc., distributors of the equipment. He served six years with OSS of the U. S. Army during World War II.

• **August H. Jaeger,** Seattle, has been appointed a district manager for the Mitchell Mfg Co. He represents the company in Washington and Oregon. Prior to joining Mitchell, Jaeger was associated with Hotpoint Co. and Kelvinator Sales Corp.

• **Alden H. Webber** has been appointed to the position of field sales engineer for the Seattle area by the Bristol Co. He has been with the company since 1943, spending his first three years as instrument service man for Bristol's New York office and then as field engineer in the same territory. Webber holds several patents in instrument design and parts. He will work out of district offices of the company at Seattle.

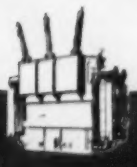
NEXT: GASEOUS INSULATION

An entirely new concept—*gas* as a power transformer insulation and coolant—is now being used by General Electric engineers at Pittsfield, Mass. The gas is sulphur hexafluoride chosen because of its high dielectric strength.

Lighter, quieter, safer . . . these are the predictions for this revolutionary design, a joint project of G.E. and the Consolidated Edison Company of New York. Above is a model of the 2000-kva, 69-kv units now being built.

Gas-insulated transformers will be *safer* because sulphur hexafluoride is non-flammable; *quieter*—because pressurized gas conducts sound far less readily than liquid; *lighter and more compact*—because the gas will eliminate heavy liquid insulation. General Electric Company, Schenectady 5, N.Y.

421-27



Power Transformer NEWS

Progress Is Our Most Important Product

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

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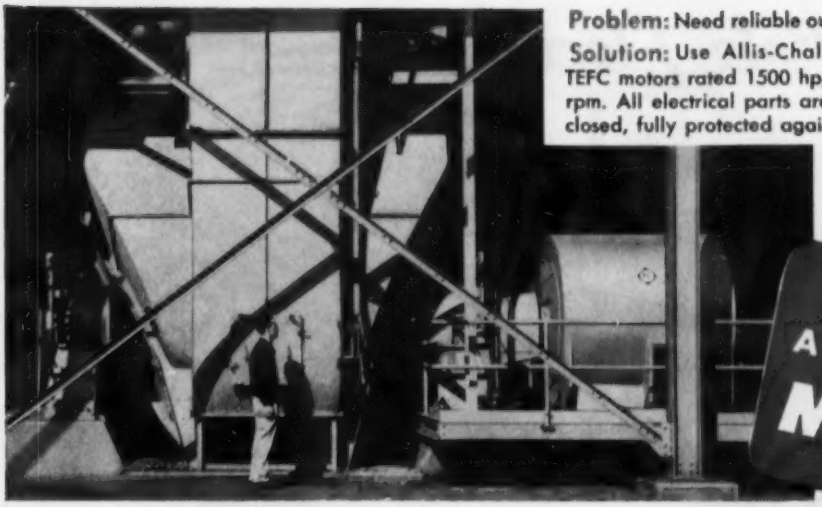
PROFILES

Karl S. Geiges, chief engineer, Underwriters' Laboratories Inc., Chicago, was visiting the new plant at Santa Clara when the Northern California Chapter, International Association of Electrical Inspectors held its meeting there in January. James A. MacNabb, just appointed engineer in charge of the new local laboratory, was host to some 200 visiting inspectors, contractors, electricians, manufacturers and utility representatives who visited the premises. Below, O. G. Wedekind of UL explains to one of the touring groups what tests are made on a TV receiver before it earns the UL label. Testing of other electrical products made in the West at this laboratory was also shown by other members of the UL staff between the inspectors' problem sessions

Taken at one of a series of meetings held by Square D for salesmen and dealers in the 11 Western states, this picture shows Mine & Smelter Supply Co. personnel at Salt Lake City, where attendance was 100%. H. H. Zimmerman, general sales manager, Square D Western division, is shown in center; W. J. Berryman, manager of Mine & Smelter, right; S. O. Bringhurst, manager of the electrical department, left; Jack Lowder, manager, Stevens Sales, Square D agents in the area, at the blackboard



Problem: Need reliable outdoor operation.

Solution: Use Allis-Chalmers tube-type TEFC motors rated 1500 hp, 4000 volts, 880 rpm. All electrical parts are completely enclosed, fully protected against weather.

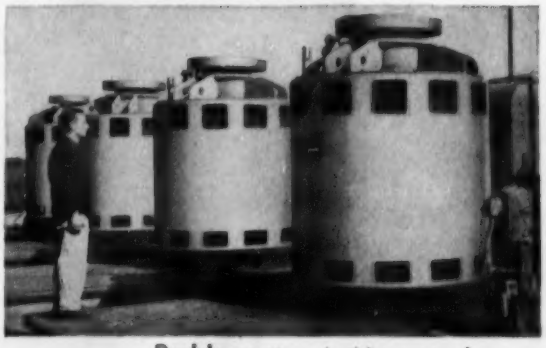
ALLIS-CHALMERS
Auxiliary-Drive
MOTORS

3 Problems — 3 Solutions

Eastern Utility Gets Exactly the Right Motor for Each Job from Allis-Chalmers

Public Service Electric and Gas Company chose Allis-Chalmers motors for many of the major auxiliaries in their Kearny (N. J.) Generating Plant. The reasons: reliability and economy.

Allis-Chalmers builds a type and size for every auxiliary drive in the power plant. Whether your problem is space, fly ash or an outdoor location, there's a motor in the Allis-Chalmers line to provide the continuity of service you need. Let an Allis-Chalmers representative help you select the motors for your job. A-4582



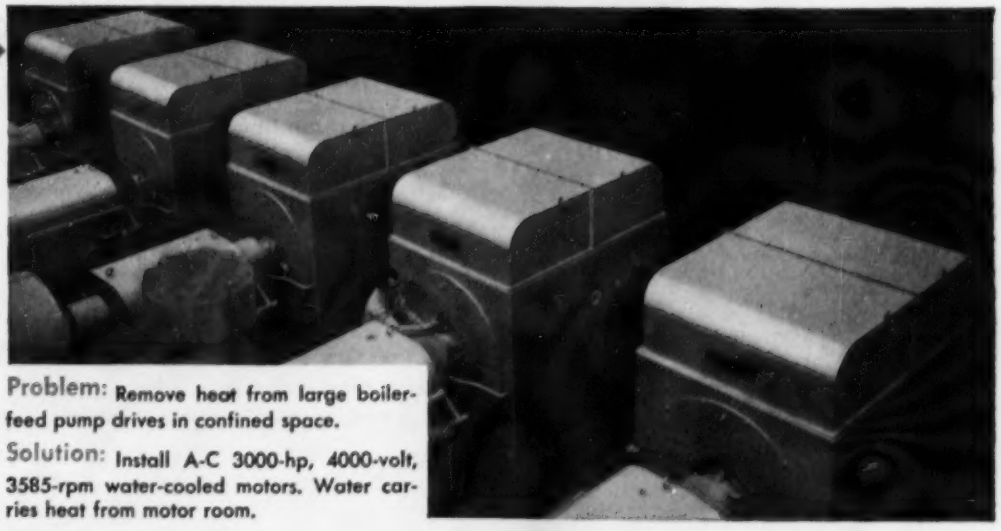
Problem: Keep building costs down.

Solution: Put pump drives outdoors, using Allis-Chalmers tube-type TEFC motors rated 350 hp, 440 volts, 400 rpm.

ALLIS-CHALMERS

Milwaukee 1, Wisconsin

A-C ALLIS-CHALMERS



Problem: Remove heat from large boiler-feed pump drives in confined space.

Solution: Install A-C 3000-hp, 4000-volt, 3585-rpm water-cooled motors. Water carries heat from motor room.

Cole Electric Co.

8439 Steller Drive TExas 0-4701 Culver City, Calif.

AIR BREAK DISCONNECTING SWITCH
115,000 volts — 1200 amperes
Type 0-2
Underhung mounting. Three-pole, single throw.
Group operated. One pole shown.
Silver to silver contacts.

When the lights go blinkety-blink..

it's probably a sign of inadequate wiring!

There you are with the lights on bright—until somebody turns on an appliance. Suddenly, the lights do a quick flicker! This annoyance happens in four out of five homes. Because today's house has more lighting, more appliances than the wiring can provide with adequate current. (This is true even in new homes!) To get full power from the lighting and appliances you have now—or plan to add later—why not see a qualified electrical contractor about adequate wiring for your house?* New wiring as well as appliances can be financed on easy bank terms. *If you're building, ask for a "Certificate of Adequate Wiring"—proof of a first-class job.*

Electricity is cheap in California!

P·G and E·

Pacific Gas and Electric Company

**For a list of qualified electric contractors in your community, write the Northern California Electrical Bureau, 1355 Market Street, San Francisco 3*

112-W-255

PCEA is tailor-made for the electric industry!

If you have some ideas on things you think would brighten the picture in your part of the electric industry—and everyone has— the P.C.E.A. would like to hear about them. Even more, we'd like to help get them done.

Your business is our business, you see. Anything aimed at better things for any aspect of the electric industry is in our field. And the P.C.E.A. is equipped with facilities and experience to cover the field thoroughly and regularly.

This is your invitation to join up and take an active part in our program. You'll discover what so many men and women in the industry have already discovered: That it's much more fun and far more effective to work with a "do something" organization whose objectives, plans and programs are tailor-made for our industry.

Get full information from either of our offices. There is no cost or obligation.

Associations do those things

that most people think just happen!

PACIFIC COAST ELECTRICAL ASSOCIATION

530 West Sixth Street, Los Angeles 14, California

681 Market Street, San Francisco 5, California